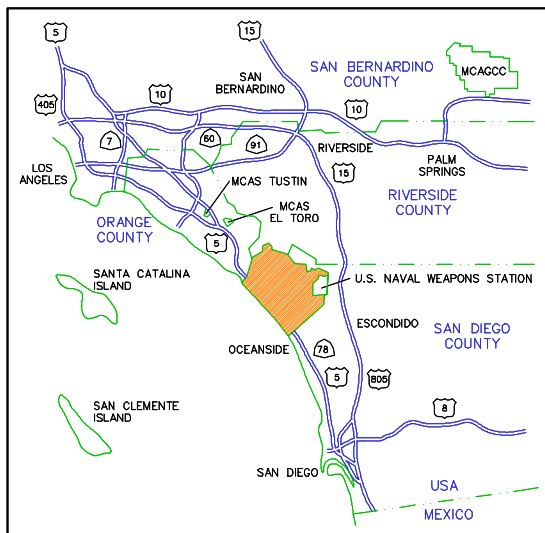


Final
Site Assessment Report
For Former Underground Storage Tank Site 1255
at Marine Corps Base Camp Pendleton



Prepared for



Naval Facilities Engineering Command
Southwest Division
1220 Pacific Highway
San Diego, California 92132-5190

CONTRACT NUMBER: N68711-01-D-6016
TASK ORDER: 0003

by

Battelle

The Business of Innovation

Environmental Restoration Department
505 King Avenue
Columbus, Ohio 43201-2693



Engineering Remediation Resources Group, Inc.
610 W. Ash St., Suite 1605
San Diego, CA 92101

November 2005

FINAL

**SITE ASSESSMENT REPORT
FOR FORMER UNDERGROUND STORAGE TANK
SITE 1255
AT MARINE CORPS BASE CAMP PENDLETON**

**Contract No. N68711-01-D-6016
Task Order No. 003**

Prepared for:

**Naval Facilities Engineering Command
Southwest Division
1220 Pacific Highway
San Diego, California 92132-5190**

Prepared by:

**Battelle
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505 King Avenue
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and

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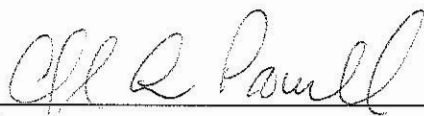
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Battelle
Environmental Restoration Department
505 King Avenue
Columbus, OH 43201

Engineering Remediation Resources Group, Inc.
610 W. Ash St. Suite 1605
San Diego, CA 92101



Signature



November 10, 2005

Date

Cheryl Prowell, P.E.

ERRG Project Manager

Name

Title



Signature

November 10, 2005

Date

David Clextan, R.G.

Battelle Project Manager

Name

Title

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ACRONYMS AND ABBREVIATIONS

AC/S ES	Assistant Chief of Staff Environmental Security
amsl	above mean sea level
APCL	Applied Physics & Chemistry Laboratories
bgs	below ground surface
btoc	below top of casing
cm/s	centimeters per second
DEH	(San Diego County) Department of Environmental Health
ERRG	Engineering/Remediation Resources Group, Inc.
FID	flame ionization detector
GC	gas chromatograph(y)
GC/MS	gas chromatography/mass spectrometry
ID	identification
I.D.	inner diameter
IDW	investigation-derived waste(s)
LCS	laboratory control sample(s)
LUFT	leaking underground fuel tank
MCAS	Marine Corps Air Station
MCB	Marine Corps Base
MDL	method detection limit
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
MS	matrix spike(s)
MSD	matrix spike duplicate(s)
MW	monitoring well
N/A	not applicable
NA	not analyzed
NAVFACSW	Naval Facilities Engineering Command, Southwest Division
NAD	North American Datum
ND	not detected
NFESC	Naval Facilities Engineering Service Center
NPWC	Navy Public Works Center
PAH	polynuclear aromatic hydrocarbon
PQL	practical quantitative limit
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QC	quality control

RPM	Remedial Project Manager
RWQCB	Regional Water Quality Control Board, San Diego Region
SAM	Site Assessment and Mitigation
SAR	Site Assessment Report
SB	soil boring
SIM	selected ion monitoring
SPLP	Synthetic Precipitation Leaching Procedure
TOT	taste and odor threshold
TPH-D	total petroleum hydrocarbons quantified as diesel
TPH-E	total petroleum hydrocarbons extractable
TPH-G	total petroleum hydrocarbons quantified as gasoline
TRPH	total recoverable petroleum hydrocarbons
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

Section 1.0: INTRODUCTION

This Site Assessment Report (SAR) was prepared by Battelle Memorial Institute (Battelle) and Engineering/Remediation Resources Group, Inc. (ERRG) for Naval Facilities Engineering Command Southwest Division (NAVFACSW), and Marine Corps Base (MCB) Camp Pendleton under Contract No. N68711-01-D-6016, Task Order No. 0003. This task order requires ERRG/Battelle to perform site assessments at three petroleum-contaminated former underground storage tank (UST) sites located at MCB Camp Pendleton within Areas 12 and 13.

This SAR was prepared following the guidelines of the San Diego County Department of Environmental Health (DEH) *Site Assessment and Mitigation (SAM) Manual* (DEH, 2004). The report includes descriptions of the assessment activities conducted (including permitting and pre-drilling preparation, borehole drilling and well installation, and soil sampling and analyses), results from the investigation conducted at Site 1255, a description of post-drilling activities, such as surveying and waste-handling procedures, and recommendations for future site activities. For a detailed description of the procedures followed during the field activities conducted at Site 1255, the sampling and analysis plan prepared for this work, and the health and safety plan adhered to during field activities, please refer to the *Final Work Plan for Characterization of Underground Storage Tank Sites in Areas 12 and 13 at Marine Corps Base Camp Pendleton* (ERRG and Battelle, 2004).

This report includes five appendices labeled Appendix A through Appendix E. Appendix A contains the lithologic logs and groundwater monitoring well completion diagrams for all soil borings drilled and the groundwater monitoring well installed at Site 1255. Appendix B contains laboratory analytical reports, chain-of-custody documentation, and laboratory quality assurance/quality control (QA/QC) data including third-party data validation. Appendices C, D, and E contain the soil boring and well installation permits, survey reports, and manifests associated with the transport and disposal of all investigation-derived wastes (IDW), respectively.

1.1 Objective of the Investigation

The objective of this project was to collect the data required to delineate the lateral and vertical extent of the hydrocarbon constituents present in the subsurface soils and groundwater surrounding the former UST location at Site 1255. The objective was accomplished using the available site data and additional data collected using the procedures described within this report.

1.2 Site Identification Data

Site Address:	Site 1255, MCB Camp Pendleton
Facility Name:	Building 13016
DEH Case No.:	H05939-168
RWQCB Release No.:	9UT2923
Property Owner:	U.S. Marine Corps
Tank Owner:	U.S. Marine Corps
Tank Operator:	U.S. Marine Corps
MCB Camp Pendleton Contact:	Mr. Chet Storrs, Assistant Chief of Staff Environmental Security (AC/S ES), Bldg. 22165 Camp Pendleton, CA 92055-5008 (760) 725-9774

Remedial Project Manager (RPM): Mr. Bipin Patel, NAVFACSW, Code OPCE.BP
1220 Pacific Highway
San Diego, CA 92132-5190
(619) 532-4814

Responsible Party: U.S. Marine Corps.

1.3 Site Description

Site 1255, which consists of Building 1255 and the region beneath and surrounding former USTs 1255-1 and 1255-2, is located within MCB Camp Pendleton Area 12 on an access road approximately 500 feet north of Vandegrift Road. Figures 1 and 2 show the location of Site 1255 within MCB Camp Pendleton. The locations of the former USTs in relation to Building 1255 are presented on Figure 5. Prior to removal on July 24, 1994, Site 1255 contained two 1,000-gallon, reinforced concrete tanks with approximately 54 feet of single-wall steel, 3 ¾-inch supply and return piping, and 24 feet of single-wall 1-inch diameter used for storage and transfer of diesel fuel. The 54 feet of supply and return piping consisted of approximately 10 feet of piping located beneath the building foundation and 44 feet of piping located below ground. The UST's excavation dimensions were 21.5 feet by 11 feet and approximately 10 feet in depth. It was reported that soil discoloration and excavation odors were noted during the tank removal. Following these activities, the excavation was backfilled with the soil that had previously been removed, as well as with clean fill material to fill the volume of the area previously occupied by the USTs. The information presented above was obtained from the Navy Public Works Center (NPWC, 1994).

1.3.1 Site Use and Structure Type. The building at Site 1255 is currently unoccupied.

1.3.2 Topography. Site 1255 is located in the transition zone between the inland valleys and eastern slope of the coastal mountains within the Camp Pendleton Mainside area. The site itself is relatively flat with a slight grade to the east/northeast.

1.3.3 Surface Hydrology. Four major stream/river valleys are located in the Camp Pendleton area: the San Mateo Creek valley, the San Onofre Creek valley, the Las Flores Creek valley, and the Santa Margarita River valley. All four valleys contain Upper Pleistocene- to Holocene-aged unnamed alluvial deposits that extend into the associated inland valleys (Odermatt and Anderson, 1994; Palmer, 1994). Tributaries and smaller streams located on Base include Talega Creek, the north and south forks of San Onofre Creek, Aliso Creek, De Luz Creek, Windmill Canyon Creek, and Pilgrim Creek.

According to the *Water Quality Control Plan for the San Diego Basin* (RWQCB, 1998), Site 1255 is located within the Mission Hydrologic Subarea of the Lower San Luis Hydrologic Area within the San Luis Rey Hydrologic Unit. The site is located approximately 2,500 feet to the west of Pilgrim Creek, which is a tributary of the San Luis Rey River.

1.3.4 Geology. Camp Pendleton is situated in the Peninsular Ranges Geomorphic Province. To the east, the province is bounded by mountain ranges (Peninsular Ranges) that separate the Colorado Desert Geomorphic Province from this province. To the west, the province is bounded by the coastline and the Newport-Inglewood-Rose Canyon fault zone. The Peninsular Ranges are a northwest- to southeast-oriented complex of fault-bounded blocks (Norris and Webb, 1990). Uplift and westward tilting of these blocks has resulted in a mountain chain more than 600 miles in length, with a steep eastern escarpment and a relatively gentle western slope extending to the coastal plain. Geomorphic characteristics found in the province include mountain slopes, foothills, inland valleys, coastal valleys, coastal slopes, and coastal plains. The stratigraphy within Camp Pendleton varies from east to west. The

eastern Base area is mountainous, containing a complex of Cretaceous-aged igneous intrusive and extrusive rocks that intrude and overlie the Jurassic-aged sedimentary rocks of the Bedford Canyon Formation. An Upper Cretaceous-aged marine conglomerate occurs in the more westerly mountain slopes and foothills. The Upper Cretaceous-aged Williams Formation occupies the foothills and inland valleys to the west of the eastern mountain range and may conformably overlie the Bedford Canyon Formation in the inaccessible artillery impact area. The Williams Formation is composed of interbedded sandstone, siltstone, and mudstone (Figure 3).

In the transition zone between the inland valleys and eastern slope of the coastal mountains, the Middle Eocene-aged Santiago Formation unconformably overlies the Williams Formation and an intermittent paleosol developed on it. The Santiago Formation consists of three members primarily composed of interbedded sandstone, silty sandstone, and mudstone. The Middle Miocene-aged San Onofre Breccia unconformably overlies the Santiago Formation and forms the backbone of the coastal San Onofre Mountains. The San Onofre Breccia consists of an overall coarsening-upward sequence of coarse sandstone to pebble and boulder breccia.

The coastal slope is occupied with relatively small, near-shore exposures of overlying Upper Miocene-aged Monterey Formation, Lower Pliocene-aged Capistrano Formation, and assorted Pleistocene-aged terrace deposits. The Monterey Formation consists of a fining-upward sequence of conglomerate, coarse sandstone, siltstone, and siliceous shale. The Capistrano Formation (San Mateo Member) consists of a tan, coarse-grained, locally pebbly, massive, well-indurated arkose. The Pleistocene-aged terrace deposits consist of marine and nonmarine sediments that unconformably overlie older stratigraphic units and consist of brown, medium-grained sandstone to pebble and cobble conglomerate (Brown and Caldwell, 1996; Cranham et al., 1994).

The near surface geology at Site 1255 consists primarily of a well-indurated, siltstone with varying amounts of sand and clay. This lithology is of the Middle-Eocene Santiago Formation.

1.3.5 Hydrogeology. Groundwater occurs primarily within four valleys that form the groundwater basins within Camp Pendleton: the San Onofre basin, the San Mateo basin, the Las Flores basin, and the Santa Margarita basin (Figure 4). These areas are associated with surficial watersheds, and contain active streams overlying alluvial and fluvial deposits that generally consist of locally derived clay, silt, sand, gravel, and cobbles. The valley-fill deposits located in these areas provide a prolific source of groundwater and, paradoxically, are characterized by a relatively level topography. Both of these qualities make the deposits desirable areas for the siting of support activities (i.e., Base housing, equipment maintenance/servicing areas, fuel stations, and the Marine Corps Air Station [MCAS]). Groundwater generally occurs at relatively shallow depths (10 to 30 feet below ground surface [bgs]) and under unconfined conditions in these locations, which are limited to the area surrounding the associated surface streams and comprise a relatively small area of the Base. The Base obtains potable water for distribution from these basins. It has been reported that groundwater occurs within a deeper, semiconfined alluvial aquifer that is separated from the shallow, unconfined alluvial aquifers on the Base by a confining layer of silt and clay. It is from this deeper, semiconfined alluvial aquifer that the Base withdraws water for supply purposes. Groundwater also occurs in the uplands, but only in localized lenses that are inferred to be perched above the unconfined and semiconfined aquifers located in the groundwater basins in the valleys. At Site 1255, perched groundwater zones were encountered at 16.5 feet bgs and 27 feet bgs. Section 2.2 contains more detailed descriptions of the groundwater conditions at this site.

According to the *Water Quality Control Plan for the San Diego Basin* (RWQCB, 1998), Site 1255 is located within the Mission Hydrologic Subarea of the Lower San Luis Hydrologic Area within the San Luis Rey Hydrologic Unit. Groundwater in this area has supply uses beneficial to municipal and domestic supply, agricultural supply, and industrial service supply. However, no

groundwater supply wells are located within 1 mile of the site. Additionally, groundwater beneath the site is found in the Santiago Formation which has a relatively low transmissivity and hydraulic conductivity, which ranges from 10^{-2} to 10^{-7} centimeters per second (cm/s) in the sand units and 10^{-7} to 10^{-10} cm/s in the silt and clay units (IT Corp., 1993). The nearest downgradient water supply well is located approximately 6 miles southwest of the site adjacent to the San Luis Rey River, which serves the City of Oceanside.

1.4 Previous Investigations

Following UST removal, a SAM inspector directed soil sampling activities at Site 1255. Three soil samples (1255-1-13, 1255-2-11, and 1255-3-12) were collected from the bottom of the tank excavation and two samples (1255-4L-1.3 and 1255-5L-1.5) were collected beneath the product line pipe. Samples were analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and total petroleum hydrocarbons as diesel (TPH-D) using United States Environmental Protection Agency (U.S. EPA) Method 8015 Modified and for total recoverable petroleum hydrocarbons (TRPH) using U.S. EPA Method 418. Following acquisition, the soil samples were analyzed by Superior Precision Analytical, Inc., in Seattle, Washington.

Based on analytical results, TPH-D concentrations in the excavation samples ranged from 18,000 milligrams per kilogram (mg/kg) to 25,000 mg/kg. TPH-D concentrations in the piping samples ranged from 170 mg/kg to 200 mg/kg. TPH-G concentrations in the excavation samples ranged from 530 mg/kg to 550 mg/kg. No TPH-G concentrations were detected in the piping samples. TRPH concentrations in the excavation samples ranged from 31,000 mg/kg to 35,000 mg/kg and 470 mg/kg in the piping samples. It should be noted that the former USTs were not reported to have stored gasoline (TPH-G) and there is no indication of its historical usage at the site. The detection of TPH-G in soil is likely a result of low-end purgeable hydrocarbons that overlap the TPH-D range. Therefore, the TPH-G was not evaluated as part of the site assessment conducted at Site 1255.

Based on final results from the soil samples collected during the UST removal operations, the SAM Division, County of San Diego, determined that the site required further action.

Section 2.0: SUMMARY OF INVESTIGATION

The primary objective of the site assessment at Site 1255 was to delineate the lateral and vertical extent of hydrocarbon constituents in the soil and groundwater. Additional objectives of this investigation included characterizing the lithology in the vadose zone and the uppermost portion of the saturated zone, evaluating the site data, and providing recommendations for future site activities. The following sections describe the activities performed to achieve the investigation objectives.

2.1 Pre-Drilling Activities

All drilling locations, as well as the general area surrounding the boring locations, were checked for underground utilities prior to drilling. Southwest Geophysics, a private subcontractor, was contracted to use geophysical methods to determine utility locations within the area under investigation. Permits were obtained from the San Diego County DEH for installation of soil borings and groundwater monitoring wells at Site 1255.

2.2 Drilling and Sampling

Eight soil borings (SBs) were advanced at Site 1255 from March 14 to April 13, 2005 and labeled 1255-SB01, 1255-SB02, 1255-SB03, 1255-SB04, 1255-SB05, 1255-SB06, 1255-SB07, and 1255-SB08. The soil borings were positioned within and surrounding the former location of UST 1255 1&2 and the former product line trench. Figure 6 illustrates soil boring locations advanced as part of this task in relation to the former location of UST 1255 1&2, as well as the footprint of Building 1255. Soil borings 1255-SB01, 1255-SB03, 1255-SB05, 1255-SB06, and 1255-SB07 were advanced to a depth of 65 feet bgs. Soil boring 1255-SB02 was advanced to a depth of 40 feet bgs, soil boring 1255-SB04 was advanced to a depth of 50 feet bgs. 1255-SB08 was advanced 20-degrees from vertical; this angled boring reached a total vertical depth of 65 feet bgs (69 linear feet). Following the completion of borehole 1255-SB01, it was observed that groundwater rapidly recharged into the open soil boring from an estimated depth of approximately 17 feet bgs. Because 1255-SB01 was drilled to a total depth of 65 feet bgs (i.e., approximately 48 feet below the recharging water), it was not practical to construct a shallow well at this location. Therefore, 1255-SB01 was backfilled and a monitoring well (1255-MW01) was installed in an adjacent borehole drilled specifically for groundwater monitoring. Water was not observed in any of the other soil borings advanced at the site; therefore, no additional groundwater monitoring wells were installed. Groundwater monitoring well (MW) installation is further described in Section 2.3.

At Site 1255, perched groundwater was initially encountered at approximately 16.5 feet bgs in the tank cavity boring (1255-SB01). A second zone of perched groundwater was also observed at 27 feet bgs in the same boring. A groundwater monitoring well (1255-MW01) was installed approximately 3 feet away from 1255-SB01, and screened across each of the perched zones (16.5 feet and 27 feet bgs). Since the time of the installation, no groundwater has accumulated and the well remains dry. Therefore, it is assumed that the perched water observed beneath the former UST excavation was present as a result of recent heavy precipitation. The less compacted, more permeable UST cavity backfill material became recharged by infiltrating rainwater, which partially saturated the underlying soils.

Following the drilling of boring 1255-SB01, it is likely that this perched water traveled downward through the well and permeated drier soils deeper in the formation. Additionally, no groundwater was observed in any of the other seven soil borings advanced at Site 1255, which were monitored for 24 hours following drilling completion. Therefore, all the information collected during this assessment indicates that no shallow groundwater exists at this site within 65 feet of the surface.

Soil samples were collected from each soil boring at 5-foot intervals using a split-spoon sampler. Headspace measurements from samples were taken by allowing the soil cuttings contained in the cutting shoe of the split-spoon sampler to warm up in a sealed plastic bag and then the resulting vapors were analyzed using a flame ionization detector (FID). All soil samples subsequently were sent to Applied Physics & Chemistry Laboratories (APCL) in Chino, CA, for analyses of total petroleum hydrocarbons-extractable (TPH-E). Selected soil samples also were analyzed for volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs). APCL is a California-certified and Navy-approved stationary analytical laboratory.

Following the site investigation, boreholes not used for the installation of groundwater monitoring wells were abandoned using a bentonite grout slurry in accordance with the guidelines presented in the San Diego County *SAM Manual* (DEH, 2004). A local subcontractor, Gibson Surveying, subsequently surveyed all borehole locations according to the North American Datum (NAD) 83 coordinate system. IDW generated during the site assessment was removed from the site and disposed of by EFR Environmental Services. Refer to the *Final Work Plan for Characterization of Underground Storage Tank Sites in Areas 12 and 13 at Marine Corps Base Camp Pendleton* (ERRG and Battelle, 2004) for a complete description of all drilling and sampling procedures, as well as information regarding equipment decontamination, surveying, and waste-handling procedures. Lithologic logs and the well completion diagram from the boreholes and the well can be found in Appendix A. A copy of the soil-boring and well installation permit is provided in Appendix C. The survey reports are provided in Appendix D, and manifests for the transport and disposal of IDW generated at Site 1255 are provided in Appendix E.

2.3 Groundwater Monitoring Well Installation, Development, and Sampling

On March 16, 2005, one groundwater monitoring well was installed at Site 1255. The monitoring well was installed approximately 3 feet to the west of soil boring 1255-SB01 and was labeled 1255-MW01 (Figure 6). This monitoring well was constructed with a 2-inch inner diameter (I.D.) schedule 40 polyvinyl chloride (PVC) casing. The screen section in the well was exposed from approximately 15 to 30 feet bgs. For a detailed description of monitoring well construction and installation procedures, refer to the *Final Work Plan for Characterization of Underground Storage Tank Sites in Areas 12 and 13 at Marine Corps Base Camp Pendleton* (ERRG and Battelle, 2004). This monitoring well was installed in accordance with the guidelines presented in the San Diego County *SAM Manual* (DEH, 2004). The monitoring well at Site 1255 was completed with a 3-foot diameter concrete pad and 12-inch-diameter flush mount access vault. Monitoring well completion diagrams are provided in Appendix A.

Because groundwater never accumulated in monitoring well 1255-MW01, this well was not developed or sampled as part of this site investigation.

2.4 Sample Analyses

All soil samples collected in the field were sent to a stationary laboratory for TPH-E analyses using EPA Method 8015 Modified. Three of the soil samples which were impacted with TPH-E constituents were analyzed by a stationary laboratory for VOCs using EPA Method 8260B, PAHs using 8270-selected ion monitoring (SIM), and Synthetic Precipitation Leaching Procedure (SPLP) for VOCs and PAHs using EPA Method 1312/8260B and 1312/8270-SIM, respectively. A discussion of the sample analytical results is presented in Sections 3.2, 3.3, and 3.4. Laboratory analytical reports, chain-of-custody documentation, and laboratory QA/QC data are provided in Appendix B.

QA/QC procedures in the field and the analytical laboratory are outlined in detail in the sampling and analysis plan contained in the *Final Work Plan for Characterization of Underground Storage*

Tank Sites in Areas 12 and 13 at Marine Corps Base Camp Pendleton (ERRG and Battelle, 2004). The laboratory QA/QC program consisted of laboratory control samples, laboratory duplicates, matrix spike/matrix spike duplicates (MS/MSDs), surrogated standards, internal standards, and method blanks. A complete description of the analytical QA/QC program is provided in the *Final Work Plan for Characterization of Underground Storage Tank Sites in Areas 12 and 13 at Marine Corps Base Camp Pendleton* (ERRG and Battelle, 2004).

Section 3.0: RESULTS OF INVESTIGATION

3.1 Summary of Site Geology and Hydrogeology

The near surface geology at Site 1255 consists primarily of a siltstone with varying amounts of sand and clay. These lithologies are of the Middle-Eocene Santiago Formation.

Hydrocarbon odors were detected in soil cuttings from boring 1255-SB01, 1255-SB03, 1255-SB04, and 1255-SB06. No hydrocarbon odors were observed in the other boreholes advanced as part of this investigation. Refer to the soil boring logs in Appendix A for a complete description of the lithologies from each soil boring, as well as for detailed information regarding hydrocarbon odors, soil staining, and various other physical characteristics of the soils.

At Site 1255, perched groundwater was initially encountered at approximately 16.5 feet bgs in the tank cavity boring (1255-SB01). A second zone of perched groundwater was also observed at 27 feet bgs in the same boring. A groundwater monitoring well (1255-MW01) was installed approximately 3 feet away from 1255-SB01, and screened across each of the perched zones (16.5 feet and 27 feet bgs). Since the time of the installation, no groundwater has accumulated and the well remains dry. Therefore, it is assumed that the perched water observed beneath the former UST excavation was present as a result of recent heavy precipitation. The less compacted, more permeable UST cavity backfill material became recharged by infiltrating rainwater, which partially saturated the underlying soils.

Following the drilling of boring 1255-SB01, it is likely that this perched water traveled downward through the well and permeated drier soils deeper in the formation. Additionally, no groundwater was observed in any of the other seven soil borings advanced at Site 1255, which were monitored for 24 hours following drilling completion. Therefore, all the information collected during this assessment indicates that no shallow groundwater exists above 65 feet bgs at this site.

3.2 Soil Sample Results and Interpretation

Soil samples were collected from eight soil borings at Site 1255: 1255-SB01, 1255-SB02, 1255-SB03, 1255-SB04, 1255-SB05, 1255-SB06, 1255-SB07, and 1255-SB08. All were advanced to a depth of approximately 65 feet bgs, with the exception of 1255-SB02, which was advanced to approximately 40 feet bgs, and 1255-SB04, which was advanced to approximately 50 feet bgs. Soil samples were collected at 5-foot intervals in each soil boring advanced at the site. Soil boring locations at Site 1255 are shown on Figure 6.

All soil samples collected from Site 1255 were sent to a stationary analytical laboratory for TPH-E analyses. Based on visual inspection of the soil cuttings and sample headspace analyses, three samples were selected to be analyzed by the stationary laboratory for more extensive analysis including VOCs and PAHs. Samples selected for the more extensive analyses were those suspected to be representative of the highest hydrocarbon concentrations relative to all samples collected at the site. Table 2 presents the results for soil samples analyzed for TPH-E, VOCs, and PAHs. Refer to the *Final Work Plan for Characterization of Underground Storage Tank Sites in Areas 12 and 13 at Marine Corps Base Camp Pendleton* (ERRG and Battelle, 2004) for a complete listing of all analytes and detection limits. Figure 7 is a contaminant distribution map for soils which illustrates the soil analysis sample results in relation to the sampling locations at Site 1255.

According to the analytical results, the soil contamination at Site 1255 appears to be located between 5 and 55 feet bgs surrounding soil borings 1255-SB01, 1255-SB02, 1255-SB03, 1255-SB04, and 1255-SB06. Detectable concentrations of TPH-D ranged from 12 to 12,700 mg/kg. The highest detection of TPH-D (12,700 mg/kg) occurred in 1255-SB01 at 30 feet bgs. Soil boring 1255-SB06 was advanced approximately 30 feet north of the tank cavity in the region formerly occupied by the product pipeline that ran from the USTs to Building 1255. In this region, detectable concentrations of TPH-D ranged from 7 to 12,600 mg/kg. Underground and overhead utilities, as well as the location of Building 1255, made it impossible to advance a soil boring in the optimum location for the collection of a product piping sample (Figure 6). VOCs (m,p-xylenes) and several PAHs were detected in the three soil samples that were selected for extended analysis. Several TPH, VOC, and PAH constituents were detected in the soil samples between the laboratory method detection limit (MDL) and the practical quantitative limit (PQL). These estimated results are not discussed in this text; however, these data are included on their respective tables. TPH, VOC, and PAH results are provided on Table 2.

It appears that two separate releases may have contributed to the current impacts at Site 1255. One release likely occurred within the UST tank cavity and another from the product pipeline in the vicinity of soil boring 1255-SB06. Figures 8 and 9 are cross sections through Site 1255 that show lithologic information, analytical results, and approximate extent of hydrocarbons remaining in the soil at the site.

Based on the analytical data collected during this site investigation a conservatively estimated volume of contaminated soil containing concentrations of TPH-D >100 mg/kg of 85,816 cubic feet (3,178 cubic yards) was determined. Based on the analytical results obtained from site investigation activities conducted by Battelle, the maximum TPH-D concentration detected in the soil at Site 1255 is 12,700 mg/kg. The mean of the TPH-D detections above the analytical detection limit of 5 mg/kg is 3,636.23 mg/kg.

3.3 Synthetic Precipitation Leaching Procedure Analytical Results

SPLP tests were performed at Site 1255 to evaluate the potential for contaminants to leach from the soil and subsequently migrate in the subsurface. SPLP tests were performed on three soil samples, collected from the same soil type (i.e., siltstone), with measurable concentrations of TPH-E (1255-SB01-10, 1255-SB01-15, and 1255-SB03-35). Only one impacted soil type, a siltstone, was encountered during the assessment activities at this site.

SPLP VOC test results indicate that VOCs including ethylbenzene and m,p-xylenes were present in the leachate generated from the selected soil samples at a maximum detected concentration of 11 µg/L and 30 µg/L, respectively. No other quantifiable concentrations of VOCs were present in the leachate generated from these soil samples. SPLP PAH results from the soil samples selected for extended analysis indicate the presence of several PAH constituents including naphthalene which was detected at 170 µg/L. This concentration exceeds the California taste and odor threshold (TOT) for drinking water of 21 µg/L for naphthalene. VOCs and PAHs detected in the leachate generated from soil samples indicate some mobility of the contaminants in the soil. However, due to the relatively low transmissivity and hydraulic conductivity of the site lithologies (i.e., 10^{-2} to 10^{-7} cm/s) there is essentially no possibility that site-related chemicals (i.e., TPH, VOCs, and PAHs) will ever reach a groundwater production well capture zone. Additionally, no VOC or PAH constituents other than naphthalene were detected above their respective regulatory screening level or no screening level exists. Analytical results for detected compounds in the SPLP leachate are presented in Table 3.

3.4 Groundwater Sample Results and Interpretation

Groundwater monitoring well 1255-MW01 was installed in soil boring 1255-SB01. Figure 6 illustrates the location of this groundwater monitoring well in relation to the former UST 1255 location, Building 1255 and vicinity, and soil borings advanced as part of the site assessment. Although groundwater was initially observed in boreholes 1255-SB01 and 1255-MW01, no groundwater was observed in the monitoring well constructed at 1255-MW01 during development or during the May 6, 2005 groundwater sampling event. As a result, no groundwater samples were collected from this well.

3.5 Field Quality Assurance/Quality Control

No groundwater samples were collected during the May 6, 2005 groundwater sampling event. Therefore, no field QA/QC samples were collected.

3.6 Laboratory Quality Assurance/Quality Control

Analyses of soil samples were performed by APCL, a California-certified laboratory, according to the *Quality Assurance Program Plan for Environmental Analysis* (APCL, 2005). Laboratory quality control (QC) was performed as described in the Section 10, *Quality Control Checks*, (see APCL, 2005). QC charts were used to verify method precision and accuracy. Tabulated QC data were reviewed by the QC Officer and analysts. In addition, the QC procedures used during gas chromatography (GC) and gas chromatography/mass spectrometry (GC/MS) analyses were based primarily on those specified in U.S. EPA 8000 (Resource Conservation and Recovery Act) and the California Leaking Underground Fuel Tank (LUFT) Field Manual methods of analysis.

Data were reviewed for conformance to generally accepted standards for data quality. The QC checks in the laboratory protocol are specific to the analytical method of interest and include laboratory control samples (LCSs), MS/MSD, surrogate spikes (if applicable), and method blanks. In general, all laboratory QC criteria were met; any discrepancies discovered during the review process were evaluated in relation to their associated environmental and field QC sample results. Holding times were met for all sample analyses, and all data released by APCL have met the internal laboratory technical data evaluation and review requirements in support of the U.S. Department of Defense Installation Restoration Program.

The analytical data, along with the associated laboratory QC information, was forwarded to an independent data validation service for data validation. A Navy Level III data validation was performed on 80% of the groundwater samples. The remaining 20% of the samples underwent a Level IV data validation. The results of the validation indicated that the data meet all analytical criteria, and these results are provided in Appendix B. The individual laboratory data sheets and the complete laboratory QA/QC documentation for the samples are included in Appendix B.

Section 4.0: EXPOSURE CONCERNS

Based on the results of the previous investigations, as well as the results of the most recent site assessment activities conducted by Battelle and ERRG, it has been concluded that there is minimal risk of exposure to contaminated soil at Site 1255. Soil samples taken from the excavation following the tank removal, as well as from the site assessment, indicate that the soil beneath former USTs 1255-1&2 contains hydrocarbon constituents. Perched groundwater was observed beneath the former UST cavity during drilling activities. However, following the installation of a shallow groundwater monitoring well, no groundwater accumulated in the well and the well has remained dry. Additionally, groundwater was not observed in the remaining seven soil borings advanced during this site assessment.

Data provided by the previous investigations and the results of this site assessment indicate that there is minimal potential for contaminant exposure to human or biological receptors at Site 1255. The contamination identified in the vadose zone is well below ground surface (between 5 and 50 feet bgs). The only contamination identified at 5 feet bgs was in soil boring 1255-SB01 through the former tank cavity. The tank cavity was backfilled with clean soil; therefore, there is no reason to suspect surficial contamination at the site. No potable groundwater drinking wells are located within 1,000 feet of the site. Additionally, due to the relatively low transmissivity and hydraulic conductivity of the site lithologies (i.e., 10^{-2} to 10^{-7} cm/s) there is a very low likelihood that site-related chemicals (i.e., TPH, VOCs, and PAHs) will ever reach a groundwater production well capture zone. Therefore, no direct exposure pathways exist at Site 1255.

Site 1255 poses no threat to protected or endangered species. No sensitive habitats are located at or within close proximity to the site.

Section 5.0: SUMMARY AND CONCLUSIONS

Eight boreholes were advanced at Site 1255; six to a depth of approximately 65 feet bgs, one to a depth of approximately 50 feet bgs, and one to a depth of approximately 40 feet bgs. The near-surface geology at Site 1255 consists primarily of a siltstone with varying amounts of sand and clay. These lithologies are of the Middle-Eocene Santiago Formation. Perched groundwater was observed in soil borings 1255-SB01 and 1255-MW01, but was not observed in any other soil boring during the investigation. During the advancement of each soil boring, soil samples were obtained at 5-foot intervals and analyzed using standard laboratory techniques. TPH-E, VOC, and PAH constituents were detected in soil samples collected from several soil borings (1255-SB01, 1255-SB02, 1255-SB03, 1255-SB04, and 1255-SB06) advanced through and adjacent to the former tank cavity. In these soil borings, TPH-E concentrations ranged from below laboratory detectable levels to 12,700 mg/kg. Several low-level detections of VOC and PAH constituents were also detected in several soil samples that were selected for extended analysis. Several VOCs and PAHs were also detected in the SPLP leachate from select soil samples. However, with the exception of naphthalene which exceeded its California TOT for drinking water, none of the detected VOC or PAH constituents were present in the leachate at levels above their regulatory screening levels or no screening level exists. In general, the soil sample data collected at Site 1255, during recent and historical soil sampling efforts at the site, indicate that the contaminant plume has been adequately defined.

A groundwater monitoring well was installed in one of the soil borings (1255-MW01) advanced as part of the site assessment conducted by Battelle during March and April 2005. Although groundwater was observed in the soil boring in which this well was installed, to date no groundwater has accumulated in the well. Therefore, groundwater monitoring well 1255-MW01 was not developed or sampled as part of this investigation.

Section 6.0: RECOMMENDATIONS

Based on the available soil analytical data collected during the site assessment conducted during March through May 2005, no further remedial action is recommended for Site 1255. In general, the soil plume has been adequately defined. Although groundwater was observed in soil boring 1255-SB01, the well subsequently installed adjacent to that boring has remained dry and no groundwater was observed in any other soil boring advanced as part of this investigation. Therefore, abandonment of this well is recommended. No direct exposure pathways exist for contaminants that remain in place, and no potable drinking water wells exist within 6 miles of the site. Additionally, due to the relatively low transmissivity and hydraulic conductivity of the site lithologies (i.e., 10^{-2} to 10^{-7} cm/s), and because groundwater at the site is either not present to at least 65 feet bgs, or is present in limited low-volume perched pockets, there is essentially no possibility that site-related chemicals (i.e., TPH, VOCs, and PAHs) will ever reach a groundwater production well capture zone.

Based on all available soil analytical data collected during the site assessment conducted during March through May 2005, source removal via excavation is recommended to the extent practical. Upon source removal, site closure with no further action should be recommended.

Section 7.0: REFERENCES

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FIGURES

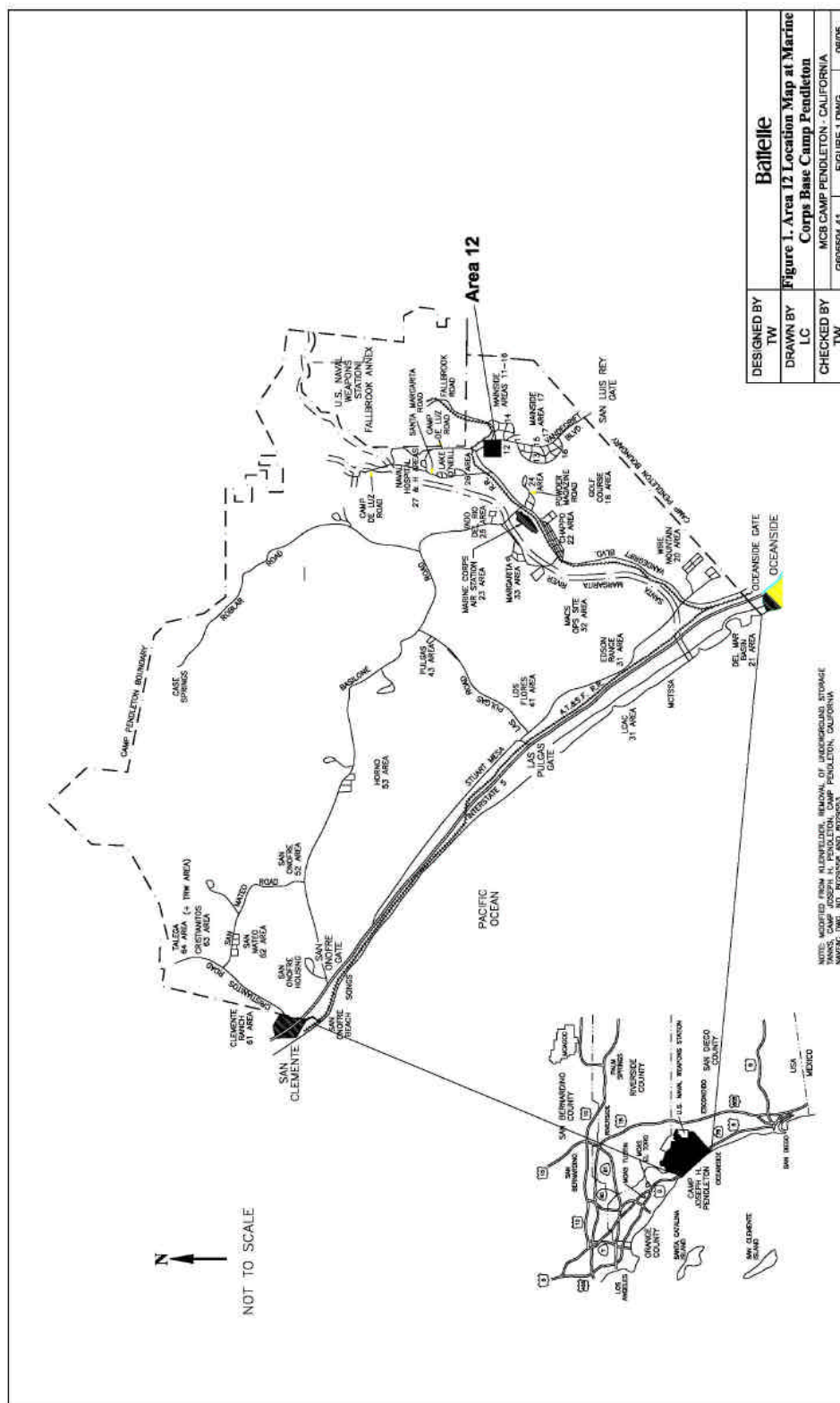


Figure 1. Area 12 Location Map at Marine Corps Base Camp Pendleton

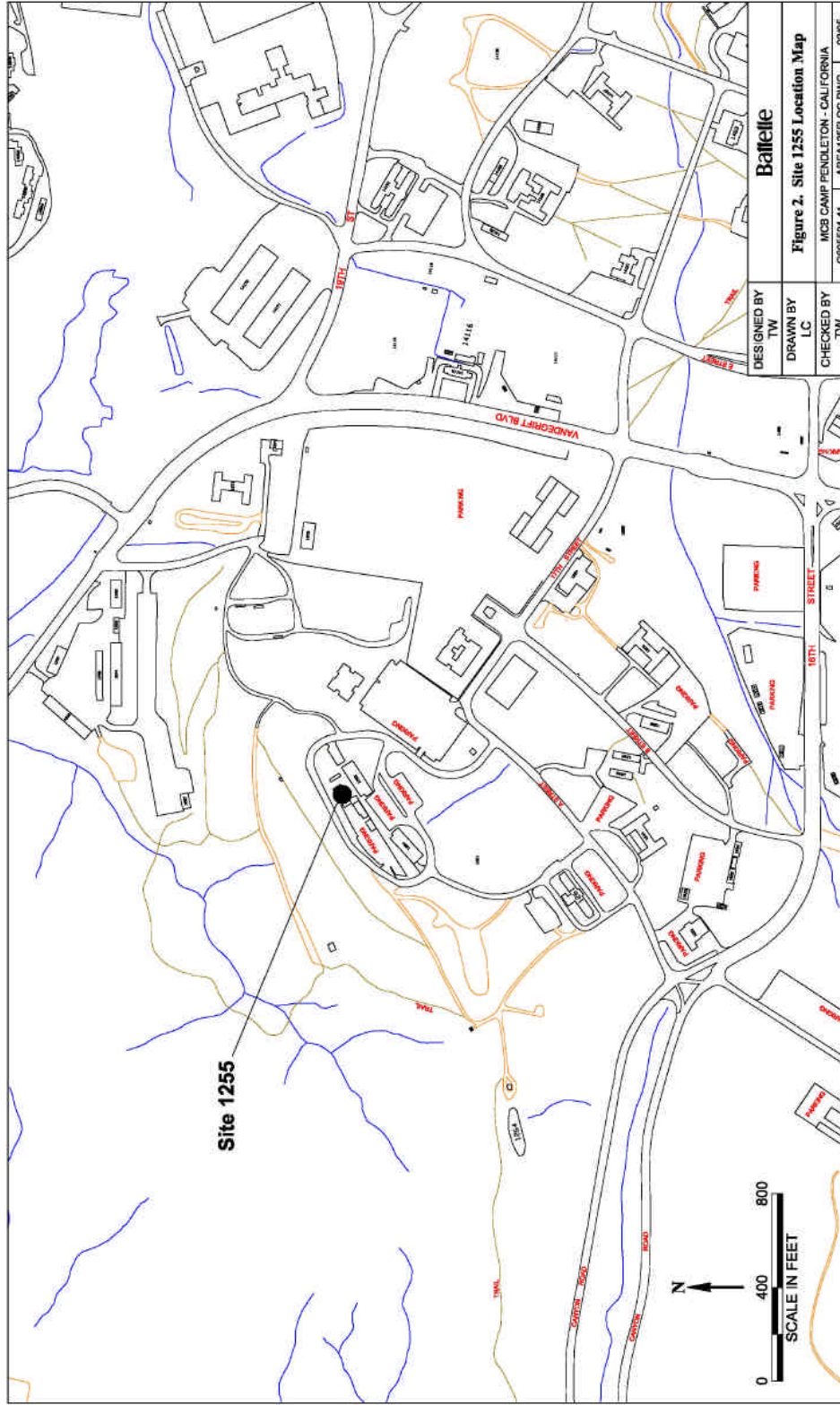


Figure 2. Site 1255 Location Map

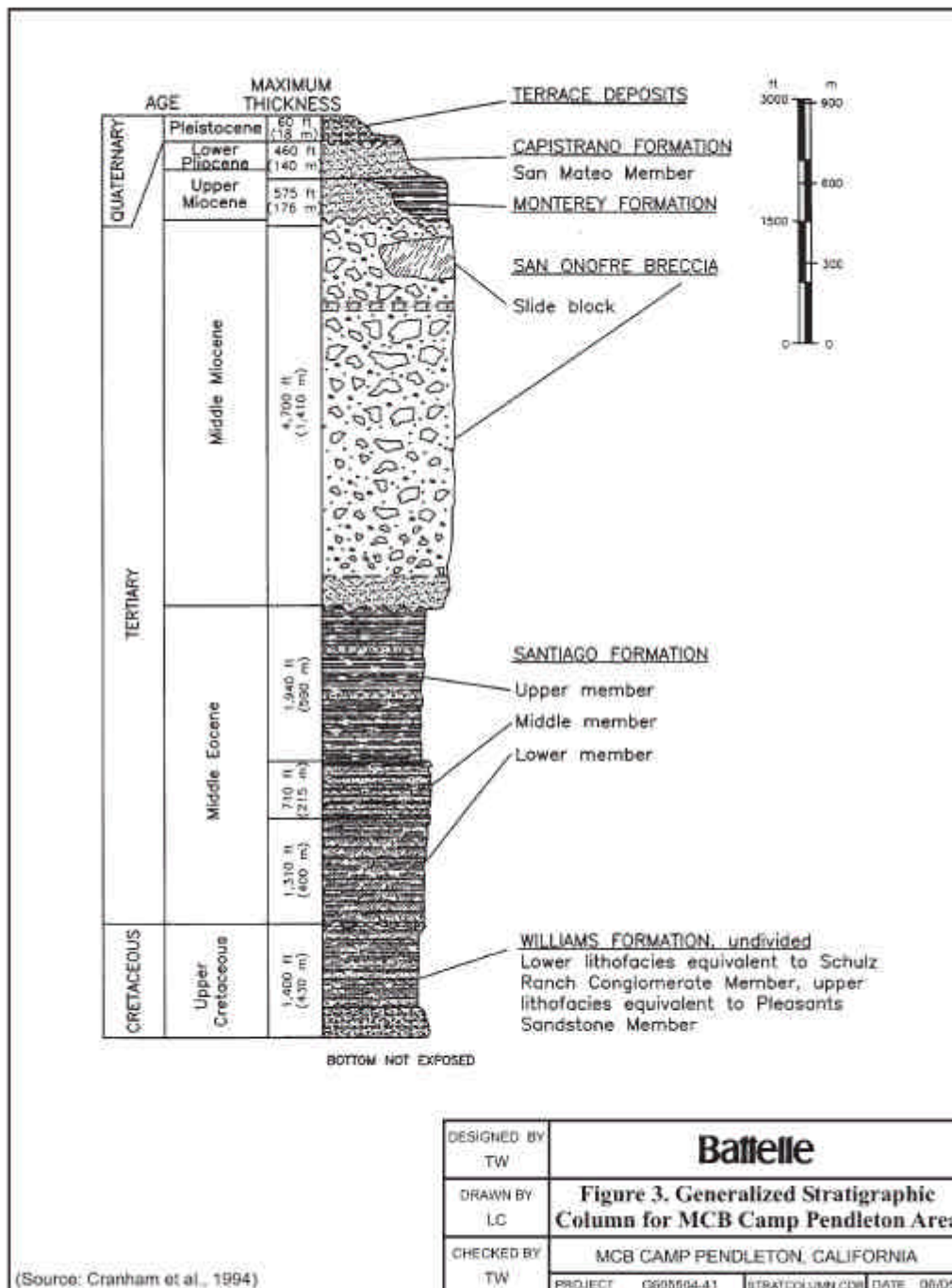


Figure 3. Generalized Stratigraphic Column for MCB Camp Pendleton Area

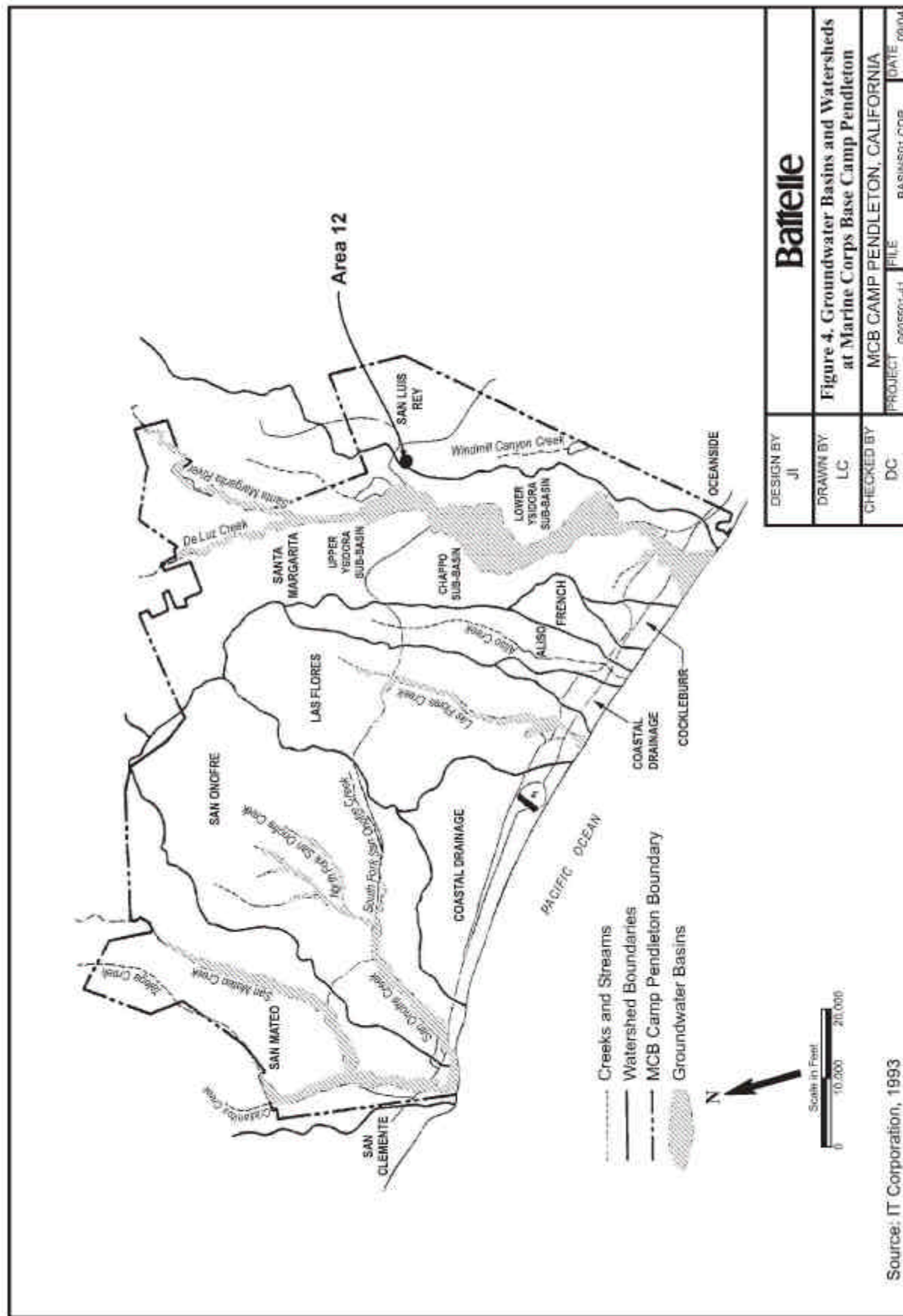
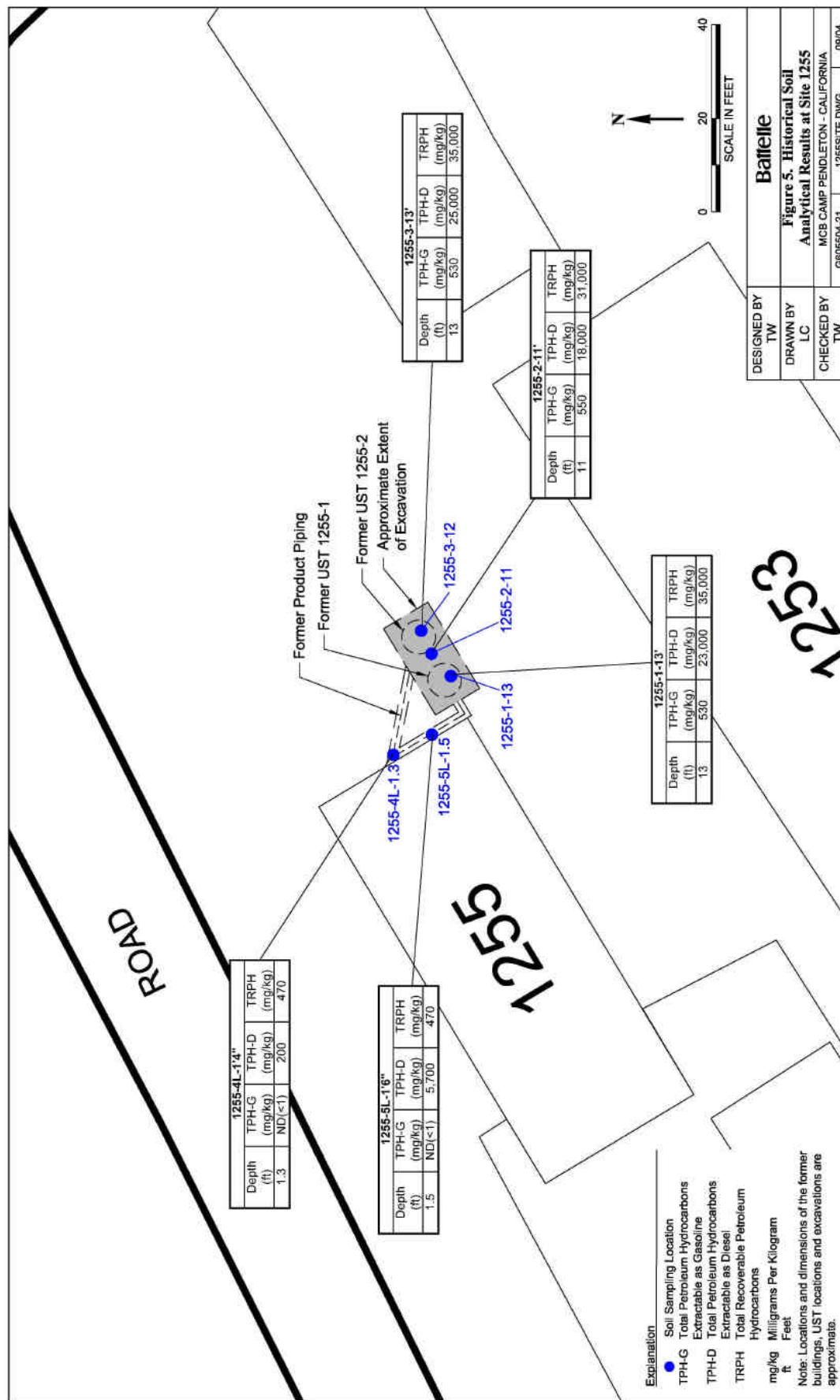
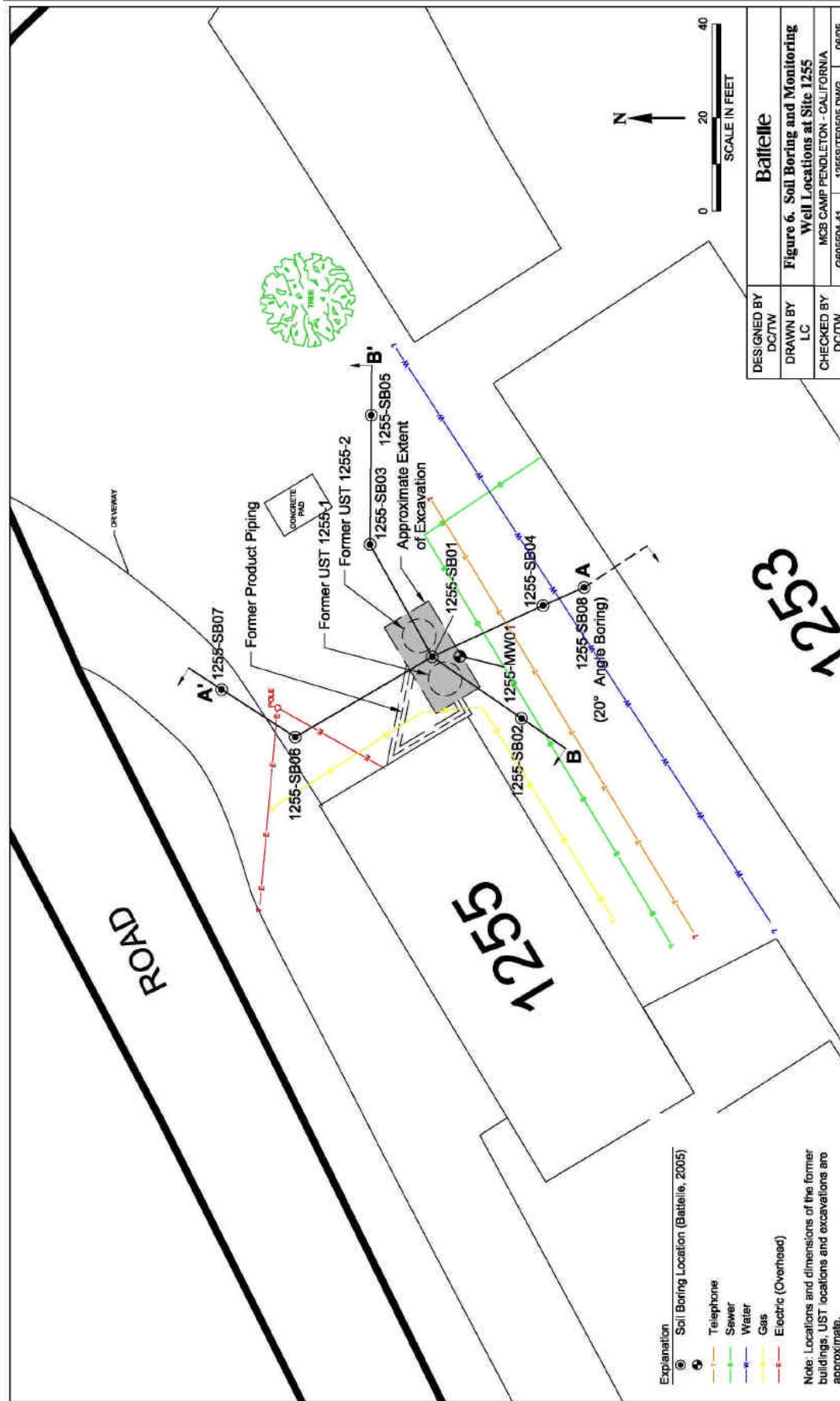
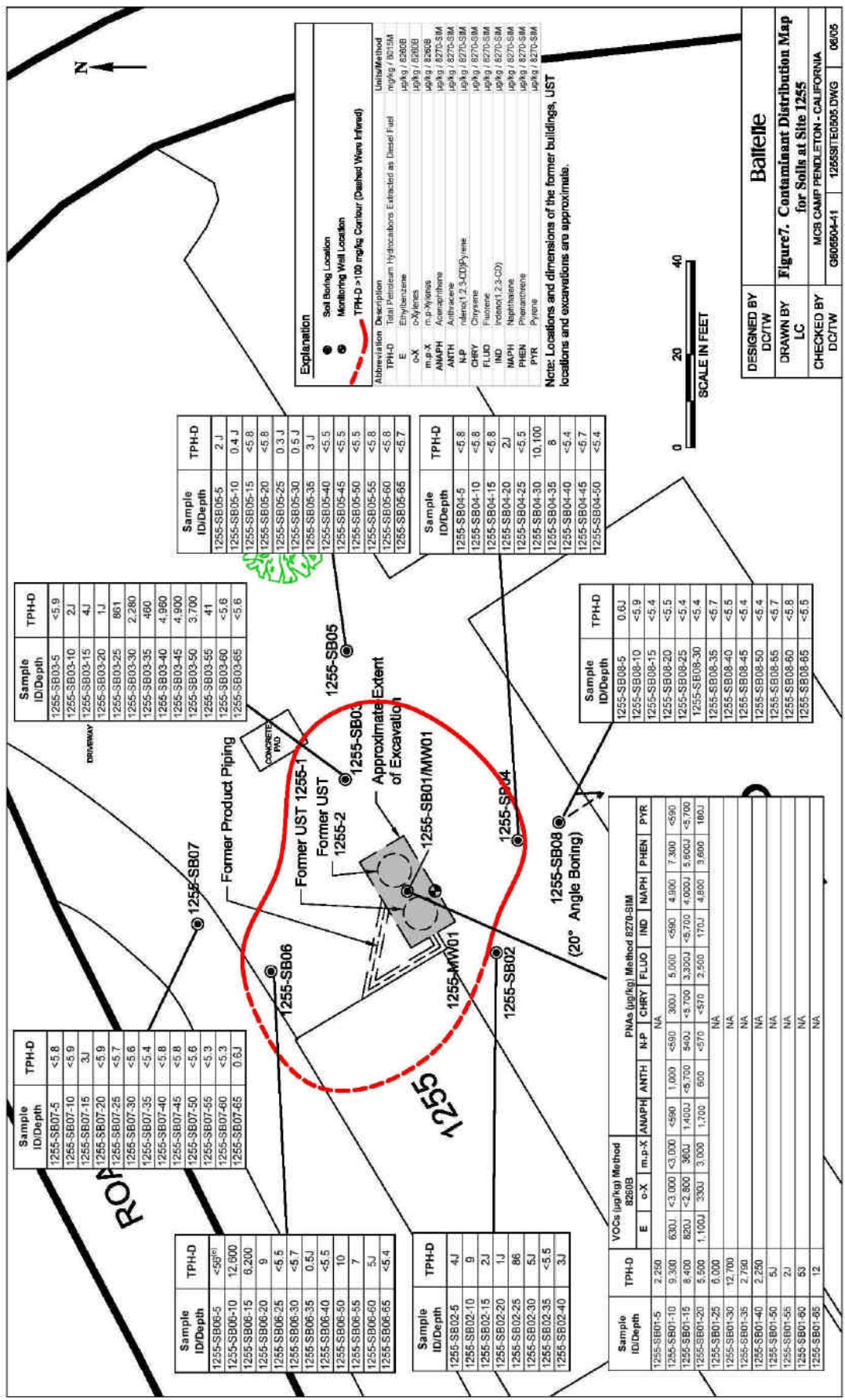
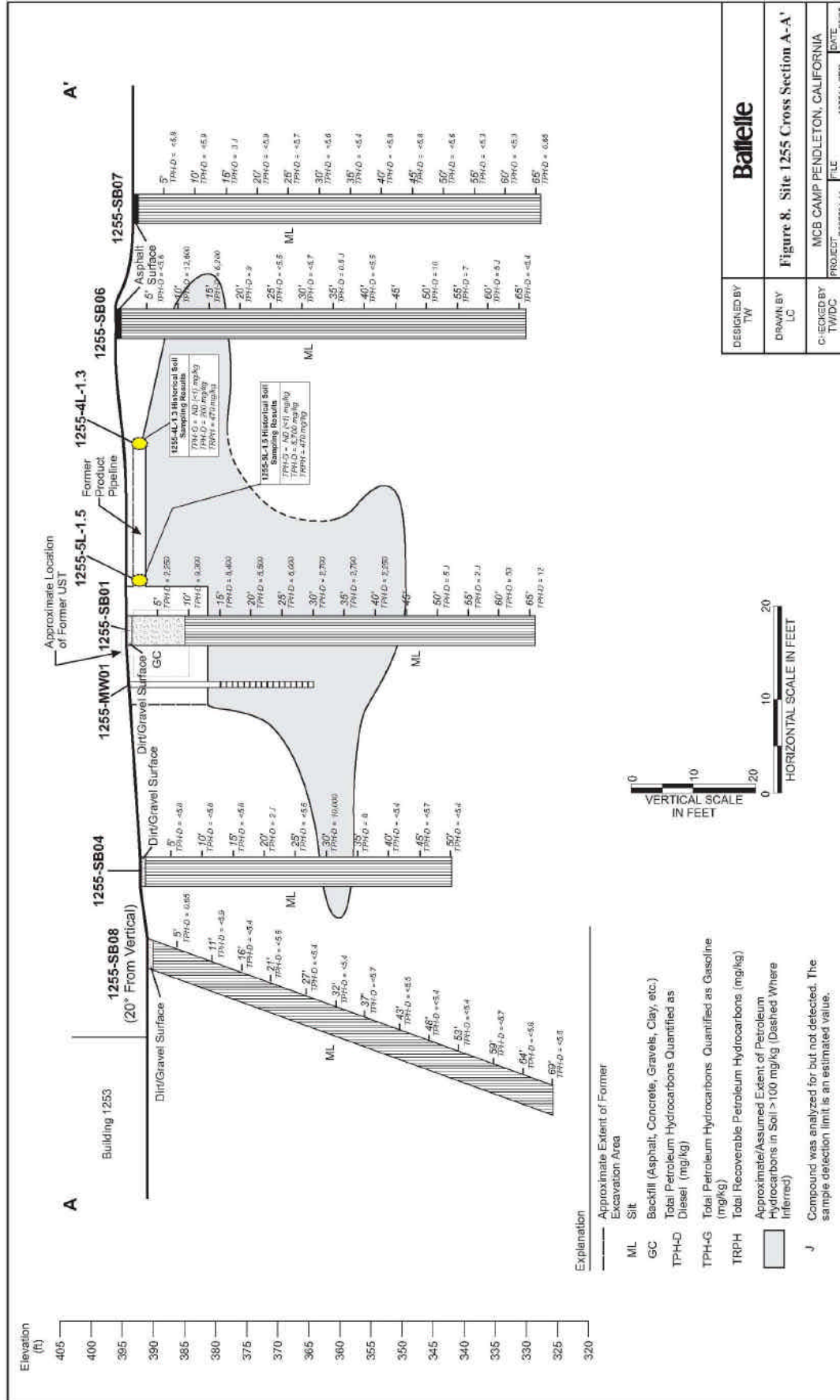


Figure 4. Groundwater Basins and Watersheds at Marine Corps Base Camp Pendleton









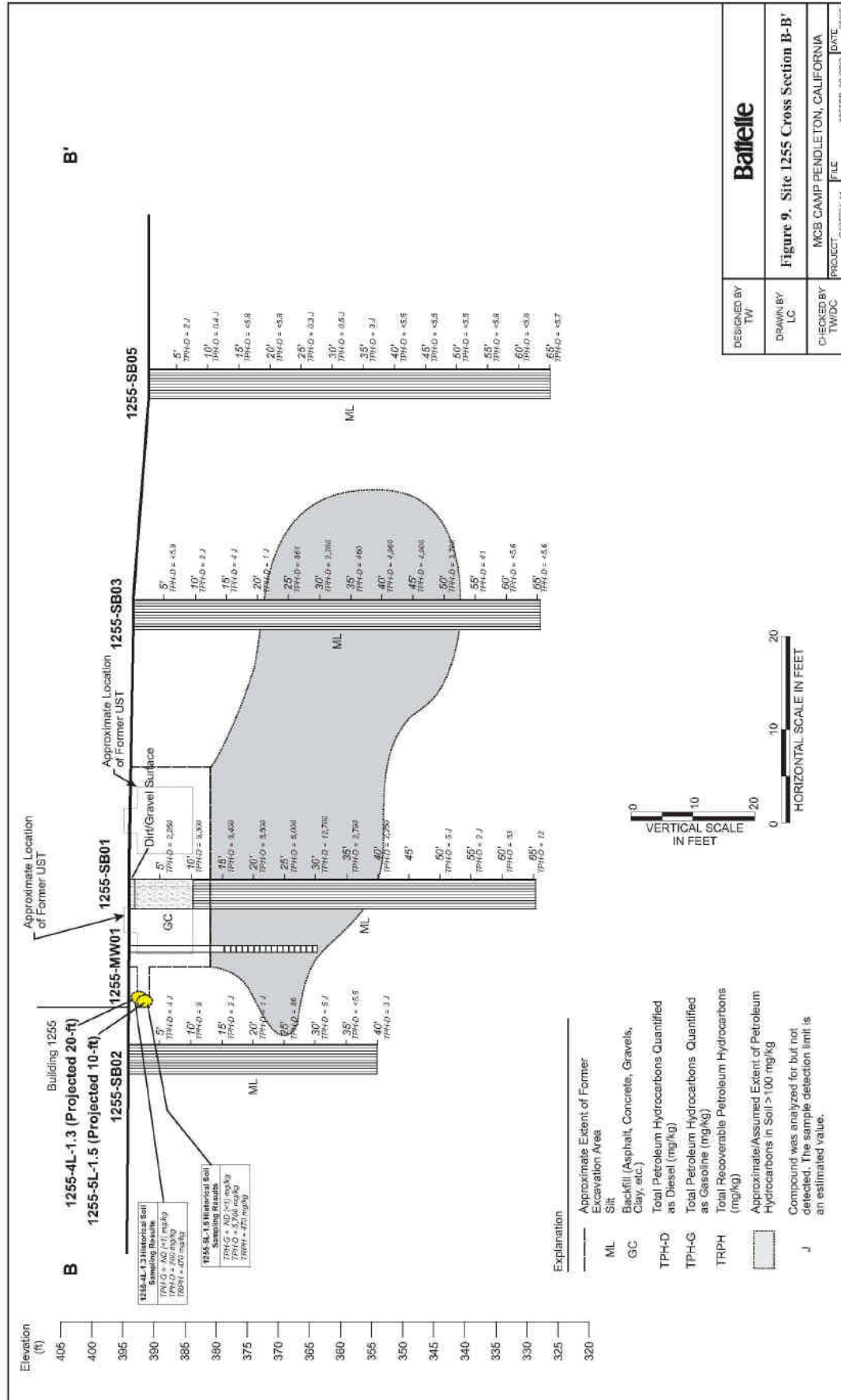


Figure 9. Site 1255 Cross Section B-B'

TABLES

Table 1. Groundwater- and Product-Level Measurements at Site 1255

Well ID	Date Measured	Top of Casing Elevation (ft amsl)	Total Depth (ft btoc)	Water Level (ft btoc)	Water Elevation (ft amsl)	Product Level (ft btoc)	Product Elevation (ft amsl)
1255-MW01	05/06/2005	393.58	30.00	dry	N/A	-	-

amsl = above mean sea level.
btoc = below top of casing.
ft = feet.
ID = identification.
N/A = not applicable

Table 2. Analytical Results for Detected Compounds in Soil Samples Collected at Site 1255

Sample ID/Depth	Date Sampled	TPH-E mg/kg Method 8015B	VOCs (µg/kg) Method 8260B			PAHs (µg/kg) Method 8270SIM										
		Diesel	Ethylbenzene	o-Xylene	m,p-Xylenes	Acenaphthene	Anthracene	Benzo(A) Anthracene	Chrysene	Fluorene	Indeno (1,2,3-CD) Pyrene	Naphthalene	Phenanthrene	Pyrene		
1255-SB01-5	03/14/05	2,250			NA											
1255-SB01-10	03/14/05	9,300	630J	<3,000	<3,000	<590	1,000	<590	300J	5,000	<590	4,900	7,300	<590		
1255-SB01-15	03/14/05	8,400	820J	<2,800	360J	1,400J	<5,700	540J	<5,700	3,300J	<5,700	4,000J	5,600J	<5,700		
1255-SB01-20	03/14/05	5,500	1,100J	330J	3,000	1,700	600	<570	<570	2,500	170J	4,800	3,600	180J		
1255-SB01-25	03/14/05	6,000			NA					NA						
1255-SB01-30	03/14/05	12,700			NA					NA						
1255-SB01-35	03/14/05	2,790			NA					NA						
1255-SB01-40	03/14/05	2,250			NA					NA						
1255-SB01-50	03/14/05	5J			NA					NA						
1255-SB01-55	03/14/05	2J			NA					NA						
1255-SB01-60	03/14/05	53			NA					NA						
1255-SB01-65	03/14/05	12			NA					NA						
1255-SB02-5	03/14/05	4J			NA					NA						
1255-SB02-10	03/14/05	9			NA					NA						
1255-SB02-15	03/14/05	2J			NA					NA						
1255-SB02-20	03/14/05	1J			NA					NA						
1255-SB02-25	03/14/05	86			NA					NA						
1255-SB02-30	03/14/05	5J			NA					NA						
1255-SB02-35	03/14/05	<5.5			NA					NA						

Table 2. Analytical Results for Detected Compounds in Soil Samples Collected at Site 1255 (continued)

Sample ID/Depth	Date Sampled	TPH-E (mg/kg) Method 8015B	VOCs (µg/kg) Method 8260B		PAHs (µg/kg) Method 8270SIM								
		Diesel	Ethylbenzene	Xylenes	Acenaphthene	Anthracene	Benzo(A) Anthracene	Chrysene	Fluorene	Indeno(1,2,3-CD) Pyrene	Naphthalene	Phenanthrene	Pyrene
1255-SB02-40	03/14/05	3J		NA						NA			
1255-SB03-5	03/15/05	<5.9		NA						NA			
1255-SB03-10	03/15/05	2J		NA						NA			
1255-SB03-15	03/15/05	4J		NA						NA			
1255-SB03-20	03/15/05	1J		NA						NA			
1255-SB03-25	03/15/05	861		NA						NA			
1255-SB03-30	03/15/05	2,280		NA						NA			
1255-SB03-35	03/15/05	460		NA						NA			
1255-SB03-40	03/15/05	4,960		NA						NA			
1255-SB03-45	03/15/05	4,900		NA						NA			
1255-SB03-50	03/15/05	3,700		NA						NA			
1255-SB03-55	03/15/05	41		NA						NA			
1255-SB03-60	03/15/05	<5.6		NA						NA			
1255-SB03-65	03/15/05	<5.6		NA						NA			
1255-SB04-5	03/15/05	<5.8		NA						NA			
1255-SB04-10	03/15/05	<5.8		NA						NA			
1255-SB04-15	03/15/05	<5.8		NA						NA			
1255-SB04-20	03/15/05	2J		NA						NA			
1255-SB04-25	03/15/05	<5.5		NA						NA			
1255-SB04-30	03/15/05	10,100		NA						NA			
1255-SB04-35	03/15/05	8		NA						NA			

Table 2. Analytical Results for Detected Compounds in Soil Samples Collected at Site 1255 (continued)

Sample ID/Depth	Date Sampled	TPH-E (mg/kg) Method 8015B	VOCs (µg/kg) Method 8260B		PAHs (µg/kg) Method 8270SIM								
		Diesel	Ethylbenzene	Xylenes	Acenaphthene	Anthracene	Benzo(A) Anthracene	Chrysene	Fluorene	Indeno(1,2,3- CD) Pyrene	Naphthalene	Phenanthrene	Pyrene
1255-SB04-40	03/15/05	<5.4		NA					NA				
1255-SB04-45	03/15/05	<5.7		NA					NA				
1255-SB04-50	03/15/05	<5.4		NA					NA				
1255-SB05-5	04/11/05	2J		NA					NA				
1255-SB05-10	04/11/05	0.4J		NA					NA				
1255-SB05-15	04/11/05	<5.8		NA					NA				
1255-SB05-20	04/11/05	<5.8		NA					NA				
1255-SB05-25	04/11/05	0.3J		NA					NA				
1255-SB05-30	04/11/05	0.5J		NA					NA				
1255-SB05-35	04/11/05	3J		NA					NA				
1255-SB05-40	04/11/05	<5.5		NA					NA				
1255-SB05-45	04/11/05	<5.5		NA					NA				
1255-SB05-50	04/11/05	<5.5		NA					NA				
1255-SB05-55	04/11/05	<5.8		NA					NA				
1255-SB05-60	04/11/05	<5.8		NA					NA				
1255-SB05-65	04/11/05	<5.7		NA					NA				
1255-SB06-5	04/11/05	<56 ^(e)		NA					NA				

Table 2. Analytical Results for Detected Compounds in Soil Samples Collected at Site 1255 (continued)

Sample ID/Depth	Date Sampled	TPH-E (mg/kg) Method 8015B	VOCs (µg/kg) Method 8260B		PAHs (µg/kg) Method 8270SIM									
		Diesel	Ethylbenzene	Xylenes	Acenaphthene	Anthracene	Benzo(A) Anthracene	Chrysene	Fluorene	Indeno(1,2,3-CD) Pyrene	Naphthalene	Phenanthrene	Pyrene	
1255-SB06-10	04/11/05	12,600			NA						NA			
1255-SB06-15	04/11/05	6,200			NA						NA			
1255-SB06-20	04/11/05	9			NA						NA			
1255-SB06-25	04/12/05	<5.5			NA						NA			
1255-SB06-30	04/12/05	<5.7			NA						NA			
1255-SB06-35	04/12/05	0.5J			NA						NA			
1255-SB07-5	04/12/05	<5.8			NA						NA			
1255-SB07-10	04/12/05	<5.9			NA						NA			
1255-SB07-15	04/12/05	3J			NA						NA			
1255-SB07-20	04/12/05	<5.9			NA						NA			
1255-SB07-25	04/12/05	<5.7			NA						NA			
1255-SB07-30	04/12/05	<5.6			NA						NA			
1255-SB07-35	04/12/05	<5.4			NA						NA			
1255-SB07-40	04/12/05	<5.8			NA						NA			
1255-SB07-45	04/12/05	<5.8			NA						NA			
1255-SB07-50	04/12/05	<5.6			NA						NA			
1255-SB07-55	04/12/05	<5.3			NA						NA			
1255-SB07-60	04/12/05	<5.3			NA						NA			
1255-SB07-65	04/12/05	0.6J			NA						NA			
1255-SB08-5	04/13/05	0.6J			NA						NA			

Table 2. Analytical Results for Detected Compounds in Soil Samples Collected at Site 1255 (continued)

Sample ID/Depth	Date Sampled	TPH-E (mg/kg) Method 8015B	VOCs (µg/kg) Method 8260B		PAHs (µg/kg) Method 8270SIM								
		Diesel	Ethylbenzene	Xylenes	Acenaphthene	Anthracene	Benzo(A) Anthracene	Chrysene	Fluorene	Indeno(1,2,3-CD) Pyrene	Naphthalene	Phenanthrene	Pyrene
1255-SB08-10	04/13/05	<5.9	NA	NA					NA				
1255-SB08-15	04/13/05	<5.4	NA	NA					NA				
1255-SB08-20	04/13/05	<5.5	NA	NA					NA				
1255-SB08-25	04/13/05	<5.4	NA	NA					NA				
1255-SB08-30	04/13/05	<5.4	NA	NA					NA				
1255-SB08-35	04/13/05	<5.7	NA	NA					NA				
1255-SB08-40	04/13/05	<5.5	NA	NA					NA				
1255-SB08-45	04/13/05	<5.4	NA	NA					NA				
1255-SB08-50	04/13/05	<5.4	NA	NA					NA				
1255-SB08-55	04/13/05	<5.7	NA	NA					NA				
1255-SB08-60	04/13/05	<5.8	NA	NA					NA				
1255-SB08-65	04/13/05	<5.5	NA	NA					NA				

J = Estimated value between the PQL and MDL.

mg/kg = milligrams per kilogram.

µg/kg = micrograms per kilogram.

NA = not analyzed.

ND = not detected.

PAH = polynuclear aromatic hydrocarbon

TPH-E = Total Petroleum Hydrocarbons, extractables range

VOC = volatile organic compound

Table 3. Analytical Results for SPLP Leachate Samples Obtained from Soil Samples Collected at Site 1255

Sample ID/Depth	Date Sampled	VOCs (µg/L) Method 8260B		PAHs (µg/L) Method 8270 SIM							
		Ethylbenzene	m,p-Xylenes	Acenaphthene	Acenaphthylene	Anthracene	Chrysene	Fluorene	Naphthalene	Phenanthrene	Pyrene
1255-SB01-10	03/14/05	<5	<10	14J	<20	<20	3J	30	50	48	<20
1255-SB01-15	03/14/05	11	7J	30	<20	15J	5J	82	170	120	7J
1255-SB03-35	03/15/05	5	30	18J	8J	<20	3J	20	50	30	<20

J = Reported between PQL and MDL

PAH = polynuclear aromatic hydrocarbon

SPLP = synthetic precipitation leaching procedure

µg/L = micrograms per liter

VOC = volatile organic compound

APPENDIX A

LITHOLOGIC LOGS AND
GROUNDWATER MONITORING WELL COMPLETION DIAGRAMS

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-MW01

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clextan #7350	Sampler Type: NA Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/14/2005 Total Depth: 30' bgs	Northing (NAD 83): 2060975.684 Easting (NAD 83): 6236537.529 Surface Elevation (NAVD 88): 394.02 Borehole Abandoned: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Type: 2" Schedule 40 PVC
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0			<u>Backfill</u> : ASPHALT, CONCRETE, GRAVELS, CLAY, etc.				Hand augered to 5' bgs
5		GC	FILL; Decomposed granite, Sand and gravel, brown to olive, damp to moist, soft, some dark gray staining, wood chips, slight hydrocarbon odor.				0'-3' Surface seal: Concrete (2 ft ³)
10			<u>Santiago Formation</u> : Sandy SILT; olive green, moist, hard, fine grained sand, roots.				0'-15' Casing
15		ML	Same				3' - 13' Seal: bentonite chips (4 ft ³)
20			SILT; light gray, dry, hard, slight hydrocarbon odor, trace clay.				13'-30' Filter Pack: #3 Sand (5 ft ³)
25			same				15'-30' Well Screen: 0.020-inch slot
30		ML	clayey SILT; light gray, dry, hard, micaceous, hydrocarbon odor.				
35			TOTAL DEPTH = 30'				No soil samples taken, boring logged from soil cuttings.
40							
45							
50							
55							
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB01

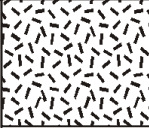
Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/14/2005 Total Depth: 65' bgs	Northing (NAD 83): 2060978.202 Easting (NAD 83): 6236540.927 Surface Elevation (NAVD 88): 394.14 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0			<u>Backfill:</u> ASPHALT, CONCRETE, GRAVELS, CLAY, etc.				Hand augered to 5' bgs
5		GC	FILL; Decomposed granite, Sand and gravel, brown to olive, damp to moist, soft, some dark gray staining, wood chips, slight hydrocarbon odor.	6	3 3 5		
10			<u>Santiago Formation:</u> Sandy SILT; olive green, moist, hard, fine grained sand, roots.	92	50 /2"		
15		ML	Same	180	45 50 /5"		
20			SILT; light gray, dry, hard, slight hydrocarbon odor, trace clay.	220	50 /6"		
25			same	400	40 50 /3"		
30		ML	clayey SILT; light gray, dry, hard, micaceous, iron oxide staining, trace fine grained sand, hydrocarbon odor.	66	40 50 /3"		0' - 65' Backfill: bentonite grout (23 ft ³)
35			clayey SILT; light gray, dry, very hard, micaceous, iron oxide staining, trace fine grained sand, slight hydrocarbon odor.	30	75 /6"		
40			No Recovery.		86 /6"		
45			No Sample Taken				
50			clayey SILT; light gray, dry, very hard, micaceous.	6.4	75 /6"		
55			SILT; light gray, moist, hard, micaceous, iron oxide staining, trace fine grained sand, slight hydrocarbon odor.	7	45 50 /3"		
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB01

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504-31 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/14/2005 Total Depth: 65' bgs	Northing (NAD 83): 2060978.202 Easting (NAD 83): 6236540.927 Surface Elevation (NAVD 88): 394.14 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
60			clayey SILT; light gray, moist, hard, some brown silty lenses, trace coarse grained sand.	6.2	50		0' - 65' Backfill: bentonite grout (23 ft³)
		ML			50		
					/6"		
65			Same		35		
			TOTAL DEPTH = 65'	7.2	65		
					/6"		
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							

SITE 1255, MCB Camp Pendleton BORING LOG - SITE 1255-SB02

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504-31 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clextion #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/14/2005 Total Depth: 40' bgs	Northing (NAD 83): 2060965.030 Easting (NAD 83): 6236527.657 Surface Elevation (NAVD 88): 394.18 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	<u>Backfill:</u> ASPHALT, WOOD DEBRIS, GRAVELS, CLAY, etc.				Hand augered to 5' bgs
5			<u>Santiago Formation:</u> SILT; buff to yellow, dry, hard, trace clay.	0	29 50 /4"		
10			Same	0	54 /6"		
15	ML		SILT; buff, damp, hard, micaceous, trace clay.	0	59 46 /6"		
20			Same	0	70 /6"		0'-40' Backfill: Bentonite Grout (14 ft³)
25			SILT; buff, dry to damp, hard, micaceous, trace clay.	0	40 50 /3"		
30	ML		clayey SILT; light gray, damp to moist, hard, micaceous, iron oxide staining.	0	60 /6"		
35			clayey SILT; light gray, dry to damp, hard, micaceous.	0	40 50 /3"		
40			<u>Same</u> TOTAL DEPTH = 40'	0	62 /6"		
45							
50							
55							
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB03

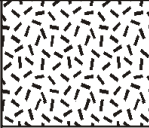
Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clextan #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/15/2005 Total Depth: 65' bgs	Northing (NAD 83): 20609997.421 Easting (NAD 83): 6236564.884 Surface Elevation (NAVD 88): 393.71 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	<u>Fill:</u> GRAVELS, CLAY, ROOTS, etc.				Hand augered to 5' bgs
5			<u>Santiago Formation:</u> SILT; brown, dry, hard, few light gray hard silt lenses, roots, slight hydrocarbon odor.	20	30 50 /5"		
10			SILT; light gray, damp to moist, hard, micaceous, trace fine grained sand, slight hydrocarbon odor.	8	34 50 /5"		
15		ML	sandy SILT; light gray, damp, hard, few buff silt lenses, fine grained sand, slight hydrocarbon odor.	8	60 /6"		
20			SILT; light gray with buff mottling, damp, hard, micaceous, some iron oxide staining, trace clay, slight hydrocarbon odor.	30	62 /6"		
25			SILT; buff, dry to damp, hard, micaceous, trace fine grained sand, stronger hydrocarbon odor.	35	40 50 /3"		
30		ML	SILT; buff with some light gray clay lenses, dry to damp, hard, micaceous, strong hydrocarbon odor.	125	59 /6"		
35			SILT; light gray, dry to damp, hard, micaceous, trace clay, strong hydrocarbon odor.	90	60 /6"		
40			SILT; light gray with few dark brown silt lenses, damp, medium hard, micaceous, trace clay, strong hydrocarbon odor.	135	30 30 32		
45		ML	Same	125	58 /6"		
50			SILT; light gray with brown to red silt lenses, damp to moist, hard, micaceous, trace clay, slight hydrocarbon odor.	70	55 /6"		
55			SILT; light gray, dry, hard, micaceous, trace clay, trace fine grained sand.	22	75 /6"		
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB03

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/15/2005 Total Depth: 65' bgs	Northing (NAD 83): 20609997.421 Easting (NAD 83): 6236564.884 Surface Elevation (NAVD 88): 393.71 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
60			SILT; light gray, dry, hard, micaceous, few brown clay lenses.	14	80 /6"		0'-65' Backfill: Bentonite Grout (23 ft³)
65		ML	Same.	12	45 50 /6"		
			TOTAL DEPTH = 65'				
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB04

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clextion #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/15/2005 Total Depth: 50' bgs	Northing (NAD 83): 20609960.421 Easting (NAD 83): 6236551.824 Surface Elevation (NAVD 88): 392.66 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	Fill: GRAVELS, CLAY, ROOTS, etc.				Hand augered to 5' bgs
5			<u>Santiago Formation:</u> SILT; buff, dry to damp, hard, micaceous, few dark brown clay lenses.	0	35 50 /5"		
10			sandy SILT; buff, damp to moist, hard, micaceous, fine grained sand, few light gray clayey lenses.	0	35 50 /5"		
15		ML	SILT; buff, damp to moist, hard, some iron oxide staining.	0	53 /6"		
20			Same	0	50 /6"		0'-50' Backfill: Bentonite Grout (18 ft³)
25			Same	0	60 /3"		
30		ML	SILT; light gray, dry to damp, hard, micaceous, trace fine grained sand, hydrocarbon odor.	100	80 /6"		
35			SILT; light gray, dry, very hard, micaceous, trace clay, trace fine grain sand strong hydrocarbon odor upper 5" of sample.	35	90 /6"		
40			SILT; light gray, dry to damp, hard, micaceous, trace clay.	12	65 /6"		Originally terminated boring @ 40'. Re-entered boring on 3/17/05 and continued to 50'.
45		ML	SILT; light gray to buff, damp, hard, micaceous, trace clay.	0	95 /6"		
50			sandy SILT; light gray, dry to damp, hard, micaceous, some iron oxide staining, fine grained sand.	0	75 /6"		
			TOTAL DEPTH = 50'				
55							
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB05

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/15/2005 Total Depth: 65' bgs	Northing (NAD 83): 20609977.645 Easting (NAD 83): 6236592.523 Surface Elevation (NAVD 88): 391.78 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	Fill: GRAVELS, CLAY, ROOTS, etc.				Hand augered to 5' bgs
5			SILT; buff, dry to damp, soft, micaceous, some gray clayey lenses.	0	6 10 4		
10			Same	0	12 15 17"		
15		ML	SILT; buff, dry to damp, soft, micaceous, some dark brown clayey lenses.	0	10 10 10"		
20			Same	0	13 20 25		0'-65' Backfill: Bentonite Grout (23 ft³)
25			Sandy SILT; buff, dry to damp, hard, micaceous, fine grained sand.	0	50 /6"		
30		ML	SILT; light gray, dry to damp, hard, micaceous, trace fine grained sand.	0	25 50 /6"		
35			SILT; light gray, dry to damp, hard, micaceous, iron oxide staining.	0	19 52 /6"		
40			Same	0	28 50 /5"		
45		ML	Same	0	19 50 /4"		
50			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	20 50 /5"		
55			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	29 50 /6"		
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB05

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Manny Pimentel Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 03/15/2005 Total Depth: 65' bgs	Northing (NAD 83): 20609977.645 Easting (NAD 83): 6236592.523 Surface Elevation (NAVD 88): 391.78 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
60			SILT; light gray, dry, hard, micaceous, heavy iron oxide staining, trace clay.	0	26		
		ML	SILT; light gray, dry, hard, micaceous, iron oxide staining, some dark brown clayey lenses.		53		
65			TOTAL DEPTH = 65'	0	45		0'-65' Backfill: Bentonite Grout (23 ft³)
					58		
					/6"		
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB06

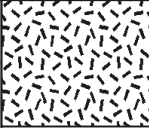
Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Dave Hogan Reviewed by: David Clextan #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 04/11/2005 Total Depth: 65' bgs	Northing (NAD 83): 20609977.645 Easting (NAD 83): 6236592.523 Surface Elevation (NAVD 88): 391.78 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	Fill: GRAVELS, CLAY, ROOTS, etc.				Hand augered to 5' bgs
5			SILT; brown, dry, hard, trace clay, roots.	0	14 50 50		
10			SILT; buff, dry, hard, trace fine grained sand, slight hydrocarbon odor.	0	23 50 /6"		
15		ML	SILT; olive green to gray, dry to damp, hard, trace clay, hydrocarbon odor.	25	22 56 /6"		
20			Same	10	56 /6"		0'-65' Backfill: Bentonite Grout (23 ft³)
25			SILT; buff, dry to damp, hard, micaceous, slight hydrocarbon odor.	18	50 /6"		
30		ML	SILT; buff, dry to damp, hard, micaceous, trace fine grained sand, very slight hydrocarbon odor.	20	25 36 36		
35			SILT; light gray, dry to damp, hard, micaceous, very slight hydrocarbon odor.	0	36 40 42		
40			Same	0	26 50 /5"		
45		ML	No Recovery	10	100 /4"		
50			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	36 50 /4"		
55			Same		28 50 /4"		
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB06

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504-31 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Dave Hogan Reviewed by: David Clexton	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 7" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 04/11/2005 Total Depth: 65' bgs	Northing (NAD 83): 20609977.645 Easting (NAD 83): 6236592.523 Surface Elevation (NAVD 88): 391.78 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
60		ML	SILT; light gray, dry, hard, dry to damp, micaceous, trace fine grained sand.	0	27		0'-65' Backfill: Bentonite Grout (23 ft ³)
			Same		50		
				0	/6"		
65			TOTAL DEPTH = 65'		45		
					58		
					/6"		
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB07

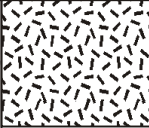
Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Dave Hogan Reviewed by: David Clextan #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 04/11/2005 Total Depth: 65' bgs	Northing (NAD 83): 2061029.142 Easting (NAD 83): 6236533.816 Surface Elevation (NAVD 88): 393.75 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	Fill: GRAVELS, CLAY, ROOTS, etc.				Hand augered to 5' bgs
5			SILT; brown, dry, hard, some clay, roots.	0	50 /5"		
10			SILT; buff, dry, medium hard, trace fine grained sand.	0	20 36 35		
15		ML	SILT; buff, dry, medium hard, some clay, trace fine grained sand.	0	18 25 29		
20			Same	0	27 45 48		0'-65' Backfill: Bentonite Grout (23 ft³)
25			SILT; buff, dry to damp, hard, micaceous.	0	26 60 /4"		
30		ML	SILT; buff, dry to damp, hard, micaceous, trace fine grained sand.	0	25 42 43		
35			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	30 50 /5"		
40			Same	0	26 50 /5"		
45		ML	SILT; light gray, dry to damp, medium hard, trace clay.	0	20 32 36		
50			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	28 60 /4"		
55			Same	0	22 50 /5"		
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB07

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Dave Hogan Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 04/11/2005 Total Depth: 65' bgs	Northing (NAD 83): 2061029.142 Easting (NAD 83): 6236533.816 Surface Elevation (NAVD 88): 393.75 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
60			SILT; light gray, dry, hard, micaceous, bottom 4" of spoon buff, damp, loose, trace medium to coarse grained sand.	0	22		0'-65' Backfill: Bentonite Grout (23 ft ³)
		ML	SILT; light gray, dry, hard, micaceous.		55		
65			TOTAL DEPTH = 65'	0	30		
					50		
					6"		
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB08

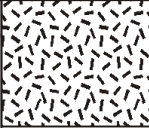
Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Dave Hogan Reviewed by: David Clextan #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 7" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 04/13/2005 Total Depth: 65' bgs	Northing (NAD 83): 2060951.646 Easting (NAD 83): 6236555.674 Surface Elevation (NAVD 88): 392.35 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
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Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
0		GC	Fill: GRAVELS, CLAY, ROOTS, etc.				20° from verticle angle boring.
5			SILT; brown, damp, soft, some clay, roots.	0	4 4 5		Hand augered to 5' bgs
10			SILT; buff, dry, hard, micaceous, trace fine grained sand.	0	20 50		
15		ML	SILT; buff, dry, hard, micaceous, trace fine grained sand.	0	62 /6"		
20			Same	0	29 58 /6"		0'-65' Backfill: Bentonite Grout (23 ft³)
25			Same	0	50 50 /6"		
30		ML	SILT; buff to light gray, dry to damp, hard, trace clay.	0	50 /6"		
35			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	50 /6"		
40			Same	0	26 50 /5"		
45		ML	SILT; light gray, dry to damp, hard, trace clay.	0	60 /6"		
50			SILT; light gray, dry to damp, hard, micaceous, trace clay.	0	30 50 /4"		
55			SILT; light gray, dry to damp, hard, micaceous, trace clay, trace fine grained sand.	0	60 /5"		
60							

SITE 1255, MCB Camp Pendleton

BORING LOG - SITE 1255-SB08

Borehole Location: Site 1255 Project Location: MCB Camp Pendleton Project #: G605504 Geologist: Tom Worthington Drilling Contractor: Baja Exploration Driller: Dave Hogan Reviewed by: David Clexton #7350	Sampler Type: 18" SS 2.0" I.D. Boring Diameter: 8" Drilling Method: HSA Drill Rig: CME 750 Hammer Type: 140 lb. Date: 04/13/2005 Total Depth: 65' bgs	Northing (NAD 83): 2060951.646 Easting (NAD 83): 6236555.674 Surface Elevation (NAVD 88): 392.35 Borehole Abandoned: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Backfill Method: Bentonite Grout Monitoring Device Installed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type: NA
--	---	---

Depth (feet bgs)	Lithology	USCS Symbol	Sample Description	FID (ppm)	Blow Counts	Boring Completion	Comments
60			SILT; light gray, dry, hard, micaceous.	0	65 /6"		20° from verticle angle boring.
65		ML	SILT; light gray, dry to damp, hard, micaceous.	0	75 /6"		0'-65' Backfill: Bentonite Grout (23 ft ³)
			TOTAL DEPTH = 65'				
70							
75							
80							
85							
90							
95							
100							
105							
110							
115							
120							

APPENDIX B

LABORATORY ANALYTICAL REPORTS, CHAIN-OF-CUSTODY DOCUMENTATION, AND LABORATORY QUALITY ASSURANCE/QUALITY CONTROL DATA

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:

Battelle - Columbus Operations

Attention: Tom Worthington

3990 Old Town Ave, Suite B-104.

San Diego CA 92110

Tel: (619)574-4826 Fax: (619)260-0882

Service ID #: 801-051883

Collected by:

Collected on: 03/14/05

Sample Description: Soil

Project Description:

Received: 03/15/05

Extracted: 03/15/05

Tested: 03/15-16/05

Reported: 03/16/05

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB01-35	1255-SB01-40	1255-SB01-50	1255-SB01-55
				05-01883-1	05-01883-2	05-01883-3	05-01883-4
MOISTURE	ASTM-D2216	%Moisture	0.5	8.4	6.8	11.8	18.3
Dilution Factor				10	10	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	2,790	2,250	5J	2J

PQL: Practical Quantitation Limit.

MDL: Method Detection Limit.

CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

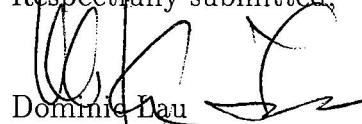
"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

Respectfully submitted,



Dominic Dau

Laboratory Director

Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

Submitted to:
Battelle - Columbus Operations
Attention: Tom Worthington
3990 Old Town Ave, Suite B-104
San Diego CA 92110
Tel: (619) 574-4826 Fax: (760) 385-4613

APCL Analytical Report

Service ID #: 801-051885

Collected by:

Collected on: 03/14/05

Sample Description: Soil

Project Description:

Received: 03/15/05

Extracted: 03/16-30/05

Tested: 03/16-04/05/05

Reported: 04/07/05

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB01-5 05-01885-1	1255-SB01-10 05-01885-2	1255-SB01-15 05-01885-3	1255-SB01-20 05-01885-4
MOISTURE	ASTM-D2216	%Moisture	0.5	11.5	15.3	12.3	12.6
Dilution Factor				10	100	100	100
PHC AS DIESEL FUEL	M8015E	mg/kg	5	2,250	9,300	8,400	5,500

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB01-25 05-01885-5	1255-SB01-30 05-01885-6	1255-SB01-60 05-01885-7	1255-SB01-65 05-01885-8
MOISTURE	ASTM-D2216	%Moisture	0.5	13.2	12.2	14.2	11.2
Dilution Factor				100	100	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	6,000	12,700	53	12

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB02-5 05-01885-9	1255-SB02-10 05-01885-10	1255-SB02-15 05-01885-11	1255-SB02-20 05-01885-12
MOISTURE	ASTM-D2216	%Moisture	0.5	12.3	13.5	13.2	11.0
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	4J	9	2J	1J

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB02-25 05-01885-13	1255-SB02-30 05-01885-14	1255-SB02-35 05-01885-15	1255-SB02-40 05-01885-16
MOISTURE	ASTM-D2216	%Moisture	0.5	14.2	12.8	9.4	12.3
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	86	5J	< 5.5	3J

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB01-10 05-01885-2	1255-SB01-15 05-01885-3	1255-SB01-20 05-01885-4
PH	9040B	pH unit	0.01	6.77	7.32	7.47

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB01-10 05-01885-2	1255-SB01-15 05-01885-3	1255-SB01-20 05-01885-4
VOC ^(a)						
Dilution Factor				500 ^(b)	500 ^(b)	500 ^(b)
BENZENE	8260B	µg/kg	5	< 3000	< 2800	< 2900
ETHYLBENZENE	8260B	µg/kg	5	630J	820J	1,100J
TERT-BUTYL METHYL ETHER	8260B	µg/kg	5	< 3000	< 2800	< 2900
TOLUENE	8260B	µg/kg	5	< 3000	< 2800	< 2900
O-XYLENE	8260B	µg/kg	5	< 3000	< 2800	330J
M,P-XYLENE	8260B	µg/kg	5	< 3000	360J	3,000
T-BUTYL ALCOHOL (TBA)	8260B	µg/kg	500	< 300000	< 280000	< 290000
DIISOPROPYL ETHER (DIPE)	8260B	µg/kg	20	< 12000	< 11000	< 11000
ETHYL-T-BUTYL ETHER (ETBE)	8260B	µg/kg	20	< 12000	< 11000	< 11000
T-AMYL METHYL ETHER (TAME)	8260B	µg/kg	20	< 12000	< 11000	< 11000
PAH ^(a)						
Dilution Factor				100 ^(b)	1000 ^(b)	100 ^(b)
ACENAPHTHENE	8270-SIM	µg/kg	5	< 590	1,400J	1,700
ACENAPHTHYLENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
ANTHRACENE	8270-SIM	µg/kg	5	1,000	< 5700	600
BENZO(A)ANTHRACENE	8270-SIM	µg/kg	5	< 590	540J	< 570
BENZO(A)PYRENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
BENZO(B)FLUORANTHENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
BENZO(G,H,I)PERYLENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
BENZO(K)FLUORANTHENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
CHRYSENE	8270-SIM	µg/kg	5	300J	< 5700	< 570
DIBENZ(A,H)ANTHRACENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
FLUORANTHENE	8270-SIM	µg/kg	5	< 590	< 5700	< 570
FLUORENE	8270-SIM	µg/kg	5	5,000	3,300J	2,500
INDENO(1,2,3-C,D)PYRENE	8270-SIM	µg/kg	5	< 590	< 5700	170J
NAPHTHALENE	8270-SIM	µg/kg	5	4,900	4,000J	4,800
PHENANTHRENE	8270-SIM	µg/kg	5	7,300	5,600J	3,600
PYRENE	8270-SIM	µg/kg	5	< 590	< 5700	180J

Component Analyzed	Method	Unit	PQL	Analysis Result	
				1255-SB01-10 05-01885-2	1255-SB01-15 05-01885-3
SPLP VOC ^(a)					
Dilution Factor				10	10
BENZENE	8260B	µg/L	0.5	< 5	< 5
ETHYLBENZENE	8260B	µg/L	0.5	< 5	11
TERT-BUTYL METHYL ETHER	8260B	µg/L	0.5	< 5	< 5
TOLUENE	8260B	µg/L	0.5	< 5	< 5
O-XYLENE	8260B	µg/L	0.5	< 5	< 5
M,P-XYLENE	8260B	µg/L	1	< 10	7J
T-BUTYL ALCOHOL (TBA)	8260B	µg/L	20	< 200	< 200
DIISOPROPYL ETHER (DIPE)	8260B	µg/L	5	< 50	< 50
ETHYL-T-BUTYL ETHER (ETBE)	8260B	µg/L	5	< 50	< 50
T-AMYL METHYL ETHER (TAME)	8260B	µg/L	5	< 50	< 50

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result	
				1255-SB01-10	1255-SB01-15
				05-01885-2	05-01885-3
SPLP PAH ^(a)					
Dilution Factor				100 ^(b)	100 ^(b)
ACENAPHTHENE	8270-SIM	µg/L	0.2	14J	30
ACENAPHTHYLENE	8270-SIM	µg/L	0.2	< 20	< 20
ANTHRACENE	8270-SIM	µg/L	0.2	< 20	15J
BENZO(A)ANTHRACENE	8270-SIM	µg/L	0.2	< 20	< 20
BENZO(A)PYRENE	8270-SIM	µg/L	0.2	< 20	< 20
BENZO(B)FLUORANTHENE	8270-SIM	µg/L	0.2	< 20	< 20
BENZO(G,H,I)PERYLENE	8270-SIM	µg/L	0.2	< 20	< 20
BENZO(K)FLUORANTHENE	8270-SIM	µg/L	0.2	< 20	< 20
CHRYSENE	8270-SIM	µg/L	0.2	3J	5J
DIBENZ(A,H)ANTHRACENE	8270-SIM	µg/L	0.2	< 20	< 20
FLUORANTHENE	8270-SIM	µg/L	0.2	< 20	< 20
FLUORENE	8270-SIM	µg/L	0.2	30	82
INDENO(1,2,3-C,D)PYRENE	8270-SIM	µg/L	0.2	< 20	< 20
NAPHTHALENE	8270-SIM	µg/L	0.2	50	170
PHENANTHRENE	8270-SIM	µg/L	0.2	48	120
PYRENE	8270-SIM	µg/L	0.2	< 20	7J

PQL: Practical Quantitation Limit. MDL: Method Detection Limit. CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

^(a) Additional analysis requested on 03/25/05.

^(b) Sample contained high concentration in Fuel Hydrocarbon, dilution was necessary.

Respectfully submitted,



Dominic Lau

Laboratory Director

Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

Submitted to:
Battelle - Columbus Operations
Attention: Tom Worthington
3990 Old Town Ave, Suite B-104.
San Diego CA 92110
Tel: (619) 574-4826 Fax: (760) 385-4613

APCL Analytical Report

Service ID #: 801-051900 Received: 03/16/05
Collected by: DJ/TW Extracted: 03/16-30/05
Collected on: 03/15/05 Tested: 03/18-04/05/05
Reported: 04/06/05

Sample Description: Soil
Project Description: G605504

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB03-5 05-01900-1	1255-SB03-10 05-01900-2	1255-SB03-15 05-01900-3	1255-SB03-20 05-01900-4
MOISTURE	ASTM-D2216	%Moisture	0.5	15.4	12.1	9.2	11.5
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.9	2J	4J	1J

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB03-25 05-01900-5	1255-SB03-30 05-01900-6	1255-SB03-35 05-01900-7	1255-SB03-40 05-01900-8
MOISTURE	ASTM-D2216	%Moisture	0.5	11.2	11.1	7.5	10.2
Dilution Factor				5	10	5	20
PHC AS DIESEL FUEL	M8015E	mg/kg	5	861	2,280	460	4,960

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB03-45 05-01900-9	1255-SB03-50 05-01900-10	1255-SB03-55 05-01900-11	1255-SB03-60 05-01900-12
MOISTURE	ASTM-D2216	%Moisture	0.5	7.3	11.7	11.9	10.9
Dilution Factor				50	20	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	4,900	3,700	41	< 5.6

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB03-65 05-01900-13	1255-SB04-5 05-01900-14	1255-SB04-10 05-01900-15
MOISTURE	ASTM-D2216	%Moisture	0.5	11.0	14.2	13.4
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.6	< 5.8	< 5.8

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB04-15 05-01900-16	1255-SB04-20 05-01900-17	1255-SB04-25 05-01900-18
MOISTURE	ASTM-D2216	%Moisture	0.5	13.1	9.2	8.5
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.8	2J	< 5.5

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APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB04-30 05-01900-19	1255-SB04-35 05-01900-20	1255-SB04-40 05-01900-21
MOISTURE	ASTM-D2216	%Moisture	0.5	12.3	7.4	7.0
Dilution Factor				50	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	10,100	8	< 5.4

Component Analyzed	Method	Unit	PQL	Analysis Result	
				1255-SB03-35 05-01900-7	
SPLP VOC ^(a)					
Dilution Factor					10
BENZENE	8260B	µg/L	0.5		< 5
ETHYLBENZENE	8260B	µg/L	0.5		5
TERT-BUTYL METHYL ETHER	8260B	µg/L	0.5		< 5
TOLUENE	8260B	µg/L	0.5		< 5
O-XYLENE	8260B	µg/L	0.5		10
M,P-XYLENE	8260B	µg/L	1		20
T-BUTYL ALCOHOL (TBA)	8260B	µg/L	20		< 200
DIISOPROPYL ETHER (DIPE)	8260B	µg/L	5		< 50
ETHYL-T-BUTYL ETHER (ETBE)	8260B	µg/L	5		< 50
T-AMYL METHYL ETHER (TAME)	8260B	µg/L	5		< 50
SPLP PAH ^(a)					
Dilution Factor					100
ACENAPHTHENE	8270-SIM	µg/L	0.2		18J
ACENAPHTHYLENE	8270-SIM	µg/L	0.2		8J
ANTHRACENE	8270-SIM	µg/L	0.2		< 20
BENZO(A)ANTHRACENE	8270-SIM	µg/L	0.2		< 20
BENZO(A)PYRENE	8270-SIM	µg/L	0.2		< 20
BENZO(B)FLUORANTHENE	8270-SIM	µg/L	0.2		< 20
BENZO(G,H,I)PERYLENE	8270-SIM	µg/L	0.2		< 20
BENZO(K)FLUORANTHENE	8270-SIM	µg/L	0.2		< 20
CHRYSENE	8270-SIM	µg/L	0.2		3J
DIBENZ(A,H)ANTHRACENE	8270-SIM	µg/L	0.2		< 20
FLUORANTHENE	8270-SIM	µg/L	0.2		< 20
FLUORENE	8270-SIM	µg/L	0.2		20
INDENO(1,2,3-C,D)PYRENE	8270-SIM	µg/L	0.2		< 20

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result
				1255-SB03-35 05-01900-7
NAPHTHALENE	8270-SIM	µg/L	0.2	50
PHENANTHRENE	8270-SIM	µg/L	0.2	30
PYRENE	8270-SIM	µg/L	0.2	< 20

PQL: Practical Quantitation Limit.

MDL: Method Detection Limit.

CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

(^a) Additional analysis requested on 03/25/05.

Respectfully submitted,



Dominic Lab
Laboratory Director
Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:

Battelle - Columbus Operations

Attention: Thomas Worthington

3990 Old Town Ave, Suite B-104.

San Diego CA 92110

Tel: (619)574-4826 Fax: (760)385-4613

Service ID #: 801-051953

Collected by: DJ/TW

Collected on: 03/17/05

Received: 03/18/05

Extracted: 03/22/05

Tested: 03/22-24/05

Reported: 03/25/05

Sample Description: Soil

Project Description: G6005504

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB04-45	1255-SB04-50	1313-SB04-5	1313-SB04-10
				05-01953-1	05-01953-2	05-01953-3	05-01953-4
MOISTURE	ASTM-D2216	%Moisture	0.5	12.0	8.0	9.4	6.7
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.7	< 5.4	< 5.5	< 5.4

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1313-SB04-15	1313-SB04-20	1313-SB04-25	1313-SB04-30
				05-01953-5	05-01953-6	05-01953-7	05-01953-8
MOISTURE	ASTM-D2216	%Moisture	0.5	9.1	11.8	11.6	12.3
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.5	< 5.7	< 5.7	< 5.7

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1313-SB05-5	1313-SB05-10	1313-SB05-15	1313-SB05-20
				05-01953-9	05-01953-10	05-01953-11	05-01953-12
MOISTURE	ASTM-D2216	%Moisture	0.5	9.5	7.8	10.3	11.5
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	10 (a)	< 5.4	< 5.6	< 5.7

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1313-SB05-25	1313-SB05-30	1313-SB06-5	1313-SB06-10
				05-01953-13	05-01953-14	05-01953-15	05-01953-16
MOISTURE	ASTM-D2216	%Moisture	0.5	12.4	12.4	5.4	5.7
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.7	< 5.7	32	< 5.3

Applied P & CH Laboratories

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Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1313-SB06-15	1313-SB06-20	1313-SB06-25	1313-SB06-30
				05-01953-17	05-01953-18	05-01953-19	05-01953-20
MOISTURE	ASTM-D2216	%Moisture	0.5	9.4	11.4	11.7	11.5
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.5	2J	< 5.7	< 5.6

PQL: Practical Quantitation Limit. MDL: Method Detection Limit. CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

(^a) Not a Diesel pattern.

Respectfully submitted,



Dennis Lau

Laboratory Director

Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

Submitted to:
Battelle - Columbus Operations
Attention: Tom Worthington
3990 Old Town Ave, B-104.
San Diego CA 92110
Tel: (619)726-0821 Fax: (614)458-6624

APCL Analytical Report

Service ID #: 801-052278
Collected by: TW/DJ
Collected on: 04/11/05

Received: 04/12/05
Extracted: 04/16/05
Tested: 04/15-19/05
Reported: 04/20/05

Sample Description: Soil
Project Description:

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB05-5 05-02278-1	1255-SB05-10 05-02278-2	1255-SB05-15 05-02278-3	1255-SB05-20 05-02278-4
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	17.8	14.7	13.1	13.3
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	2J	0.4J	< 5.8	< 5.8

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB05-25 05-02278-5	1255-SB05-30 05-02278-6	1255-SB05-35 05-02278-7
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	9.0	12.2	11.0
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	0.3J	0.5J	3J

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB05-40 05-02278-8	1255-SB05-45 05-02278-9	1255-SB05-50 05-02278-10
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	8.7	8.7	9.7
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.5	< 5.5	< 5.5

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB05-55 05-02278-11	1255-SB05-60 05-02278-12	1255-SB05-65 05-02278-13
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	14.2	13.9	12.7
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.8	< 5.8	< 5.7

PQL: Practical Quantitation Limit. MDL: Method Detection Limit.

CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

Respectfully submitted,


Donnie Nau
Laboratory Director
Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:

Battelle - Columbus Operations

Attention: Tom Worthington

3990 Old Town Ave, B-104.

San Diego CA 92110

Tel: (619)726-0821 Fax: (614)458-6624

Service ID #: 801-052279

Collected by:

Collected on: 04/11-12/05

Received: 04/12/05

Extracted: 04/15/05

Tested: 04/15-18/05

Reported: 04/20/05

Sample Description: Soil

Project Description:

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB06-5 05-02279-1	1255-SB06-10 05-02279-2	1255-SB06-15 05-02279-3	1255-SB06-20 05-02279-4
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	11.4	13.6	14.4	13.5
Dilution Factor				10	100	100	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 56 ^(a)	12,600	6,200	9

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB06-25 05-02279-5	1255-SB06-30 05-02279-6	1255-SB06-35 05-02279-7	1255-SB06-40 05-02279-8
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	8.8	12.7	12.7	8.5
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.5	< 5.7	0.5J	< 5.5

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB06-50 05-02279-9	1255-SB06-55 05-02279-10	1255-SB06-60 05-02279-11	1255-SB06-65 05-02279-12
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	8.2	7.9	10.6	8.2
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	10	7	5J	< 5.4

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB07-5 05-02279-13	1255-SB07-10 05-02279-14	1255-SB07-15 05-02279-15
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	13.6	15.8	14.9
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.8	< 5.9	3J

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB07-20 05-02279-16	1255-SB07-25 05-02279-17	1255-SB07-30 05-02279-18
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	14.6	11.8	10.3
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.9	< 5.7	< 5.6

PQL: Practical Quantitation Limit.

MDL: Method Detection Limit.

CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

(^a) Sample contained Motor Oil, dilution was necessary.

Respectfully submitted,



Dominic Lau
Laboratory Director

Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:

Battelle - Columbus Operations

Attention: Tom Worthington

3990 Old Town Ave

San Diego CA 92110

Tel: (619)726-0821 Fax: (614)458-6624

Service ID #: 801-052297

Collected by: DJ/TW

Collected on: 04/12-13/05

Received: 04/13/05

Extracted: 04/16/05

Tested: 04/15-19/05

Reported: 04/20/05

Sample Description: Soil from Camp Pendleton.

Project Description: G605504

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB07-35	1255-SB07-40	1255-SB07-45	1255-SB07-50
				05-02297-1	05-02297-2	05-02297-3	05-02297-4
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	6.7	14.3	13.3	10.9
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.4	< 5.8	< 5.8	< 5.6

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB07-55	1255-SB07-60	1255-SB07-65	1255-SB08-5
				05-02297-5	05-02297-6	05-02297-7	05-02297-8
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	5.3	5.0	7.6	14.9
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.3	< 5.3	0.6J	0.6J

Component Analyzed	Method	Unit	PQL	Analysis Result			
				1255-SB08-10	1255-SB08-15	1255-SB08-20	1255-SB08-25
				05-02297-9	05-02297-10	05-02297-11	05-02297-12
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	15.0	7.8	9.7	7.2
Dilution Factor				1	1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.9	< 5.4	< 5.5	< 5.4

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB08-30	1255-SB08-35	1255-SB08-40
				05-02297-13	05-02297-14	05-02297-15
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	7.5	12.4	8.5
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.4	< 5.7	< 5.5

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Component Analyzed	Method	Unit	PQL	Analysis Result		
				1255-SB08-45 05-02297-16	1255-SB08-50 05-02297-17	1255-SB08-55 05-02297-18
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	7.6	7.5	12.5
Dilution Factor				1	1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.4	< 5.4	< 5.7

PQL: Practical Quantitation Limit. MDL: Method Detection Limit. CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

Respectfully submitted,



Dominic Rau
Laboratory Director
Applied P & CH Laboratories

Applied P & CH Laboratories

13760 Magnolia Ave., Chino, CA 91710

Tel: (909) 590-1828 Fax: (909) 590-1498

APCL Analytical Report

Submitted to:

Battelle - Columbus Operations

Attention: Tom Worthington

3990 Old Town Ave B-104.

San Diego CA 92110

Tel: (619)726-0821 Fax: (614)458-6624

Service ID #: 801-052317

Received: 04/15/05

Collected by: TW/DJ

Extracted: 04/16/05

Collected on: 04/13/05

Tested: 04/15-19/05

Reported: 04/20/05

Sample Description: Soil from Camp Pendleton.

Project Description: G605504

Analysis of Soil Samples

Component Analyzed	Method	Unit	PQL	Analysis Result	
				1255-SB08-60 05-02317-1	1255-SB08-65 05-02317-2
MOISTURE, PERCENT	ASTM-D2216	%Moisture	0.5	13.8	8.3
Dilution Factor				1	1
PHC AS DIESEL FUEL	M8015E	mg/kg	5	< 5.8	< 5.5

PQL: Practical Quantitation Limit.

MDL: Method Detection Limit.

CRDL: Contract Required Detection Limit

N.D.: Not Detected or less than the practical quantitation limit.

"-": Analysis is not required.

J: Reported between PQL and MDL.

† All results are reported on dry basis for soil samples.

Listed Dilution Factors (DF) are relative to the method default DF. All unlisted DFs are 1.0

Respectfully submitted,


Dominic Lau
Laboratory Director
Applied P & CH Laboratories

APPENDIX C

SOIL BORING AND WELL INSTALLATION PERMIT



PERMIT #LMON102947

A.P.N. #101-520-15

EST #H05939-168

**COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION**

MONITORING WELL AND BORING CONSTRUCTION AND DESTRUCTION PERMIT

SITE NAME: SITE 1255 & SITE 1294 CAMP PENDLETON

SITE ADDRESS: MARINE CORPS BASE CAMP PENDLETON CA 92055

PERMIT FOR: **8 GROUNDWATER MONITORING WELLS & 6 BORINGS**

PERMIT APPROVAL DATE: MARCH 2, 2005

PERMIT EXPIRES ON: JUNE 30, 2005

RESPONSIBLE PARTY: AC/S ENVIRONMENTAL SECURITY

PERMIT CONDITIONS:

1. Wells must have a **minimum 3-foot concrete surface seal**. The surface seal shall consist of concrete able to withstand the maximum anticipated load without cracking or deteriorating. The concrete should meet Class A specifications of a minimum 4000-pound compressive strength.
2. All water and soil resulting from the activities covered by this permit must be managed, stored and disposed of as specified in the SAM Manual in Section 5, E- 4. (http://www.sdcountry.ca.gov/deh/lwq/sam/manual_guidelines.html). In addition, drill cuttings must be properly handled and disposed in compliance with the Stormwater Best Management Practices of the local jurisdiction.
3. Within 60 days of completing work, submit a well construction report, including all well and/or boring logs and laboratory data to the Well Permit Desk. This report must include all items required by the SAM Manual, Section 5, Pages 6 & 7.
4. This office must be given 48-hour notice of any drilling activity on this site and advanced notification of drilling cancellation. Please contact the Well Permit Desk at 619) 338-2339.

NOTE: This permit does not constitute approval of a work plan as defined in Section 2722 of Article 11 of C.C.R., Title 23. Work plans are required for all unauthorized release investigations in San Diego County.

APPROVED BY: Carol Spangenberg DATE: 3.2.2005
CAROL SPANGENBERG

NOTIFIED: V.M 3-2-05
AC PEX

APPENDIX D
SITE SURVEY DATA

Pt. No.	Field Pt. Name	Field Pt. Class	Survey Date	Latitude	Longitude	X-Y Method	X-Y Datum	X-Y Acc Value	GPS Equip Type	Elevation Casing	Elevation Rim	Elev Method	Elev Datum	Elevation Acc Value
7130	1294-MW03	MW	5/7/2005	33.3202013	-117.3131477	CONV	NAD83	6	6	289.74	290.1	TRIG	NAVD88	6
7131	1294-MW01	MW	5/7/2005	33.3201085	-117.3130861	CONV	NAD83	6	6	289.47	289.97	TRIG	NAVD88	6
7132	1294-MW02	MW	5/7/2005	33.3201073	-117.3131769	CONV	NAD83	6	6	289.38	289.93	TRIG	NAVD88	6
7133	1294-SB04	BH	5/7/2005	33.3201082	-117.3132347	CONV	NAD83	6	6		289.77	TRIG	NAVD88	6
7134	1294-SB05	BH	5/7/2005	33.3200472	-117.3131794	CONV	NAD83	6	6		294.79	TRIG	NAVD88	6
7155	1255-MW01	MW	5/7/2005	33.3179626	-117.3143088	CONV	NAD83	6	6	393.58	394.14	TRIG	NAVD88	6
7156	1255-SB02	BH	5/7/2005	33.317926	-117.3143518	CONV	NAD83	6	6		394.18	TRIG	NAVD88	6
7157	1255-SB03	BH	5/7/2005	33.3180161	-117.314231	CONV	NAD83	6	6		393.71	TRIG	NAVD88	6
7158	1255-SB04	BH	5/7/2005	33.317914	-117.3142725	CONV	NAD83	6	6		392.66	TRIG	NAVD88	6
7159	1255-SB05	BH	5/7/2005	33.3179625	-117.3141399	CONV	NAD83	6	6		391.78	TRIG	NAVD88	6
7160	1255-SB06	BH	5/7/2005	33.3180125	-117.3145634	CONV	NAD83	6	6		396.53	TRIG	NAVD88	6
7161	1255-SB07	BH	5/7/2005	33.3181024	-117.3143338	CONV	NAD83	6	6		393.75	TRIG	NAVD88	6
7162	1255-SB08	BH	5/7/2005	33.31789	-117.3142596	CONV	NAD83	6	6		392.35	TRIG	NAVD88	6
7195	1313-MW01	MW	5/7/2005	33.3000753	-117.3139059	CONV	NAD83	6	6	362.42	362.87	TRIG	NAVD88	6
7196	1313-RW01	MW	5/7/2005	33.3001842	-117.3139688	CONV	NAD83	6	6	363.68	364.12	TRIG	NAVD88	6
7197	1313-MW03	MW	5/7/2005	33.3000977	-117.3140406	CONV	NAD83	6	6	364.39	364.85	TRIG	NAVD88	6
7198	1313-MW02	MW	5/7/2005	33.3001491	-117.3140255	CONV	NAD83	6	6	363.98	364.3	TRIG	NAVD88	6
7199	1313-SB02	BH	5/7/2005	33.3002363	-117.3139591	CONV	NAD83	6	6		363.49	TRIG	NAVD88	6
7200	1313-SB03	BH	5/7/2005	33.3002142	-117.3139067	CONV	NAD83	6	6		363.31	TRIG	NAVD88	6
7201	1313-SB04	BH	5/7/2005	33.3002302	-117.314001	CONV	NAD83	6	6		364.16	TRIG	NAVD88	6
7202	1313-SB06	BH	5/7/2005	33.3001437	-117.3139427	CONV	NAD83	6	6		363.27	TRIG	NAVD88	6

[illegible]

APPENDIX E

MANIFEST FOR TRANSPORT AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

NON-HAZARDOUS WASTE MANIFEST		1. Generator's US EPA ID No. C.A.2.1.7.0.0.2.3.5.3.3	Manifest Document No. 2.5.0.8.4	2. Page 1 of 1
3. Generator's Name and Mailing Address USMC AC/S ENVIRO. SECURITY PO Box 555008 CAMP PENDLETON, CA 92055				
4. Generator's Phone (760) 725-3617 ATTN: TRACY SAHAGUN				
5. Transporter 1 Company Name EFR ENVIRONMENTAL SERVICES, INC.		6. US EPA ID Number C.A.R.0.0.0.0.1.1.2.0.5	A. Transporter's Phone 619-722-6781	
7. Transporter 2 Company Name		8. US EPA ID Number	B. Transporter's Phone	
9. Designated Facility Name and Site Address DOME ROCK INDUSTRIES, INC. 3125 W. DOME ROCK RD. QUARTZSITE, AZ 85346		10. US EPA ID Number A.Z.R.0.0.0.0.3.5.9.1.5	C. Facility's Phone 928 927-7688	
11. Waste Shipping Name and Description		12. Containers No.	13. Total Quantity	14. Unit Wt/Vol
a. NON-HAZARDOUS WASTE SOLID		053	22.000	P
b. NON-HAZARDOUS WASTE LIQUID		0.03 D.M.0.0.1.65		G
c.				
d.				
D. Additional Descriptions for Materials Listed Above 11A. ACCEPTANCE# (SOIL CUTTINGS) 4321PW370 11B. ACCEPTANCE# (PURGE WATER) 5167SC239 SITE NO: 1299, 1255, 1373		E. Handling Codes for Wastes Listed Above		
15. Special Handling Instructions and Additional Information ALWAYS WEAR APPROPRIATE P.P.E. AND USE SAFE HANDLING METHODS. 24 HR. EMERGENCY NUMBER 1-800-244-1202/619-722-6781 *EFR*				
16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.				
Printed/Typed Name Margo Williams		Signature Margo Williams		Month Day Year 06 06 05
17. Transporter 1 Acknowledgement of Receipt of Materials		Signature Douglas Ford		Month Day Year 06 06 05
18. Transporter 2 Acknowledgement of Receipt of Materials		Signature		Month Day Year
19. Discrepancy Indication Space				
20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.				
Printed/Typed Name		Signature		Month Day Year

ORIGINAL - RETURN TO GENERATOR